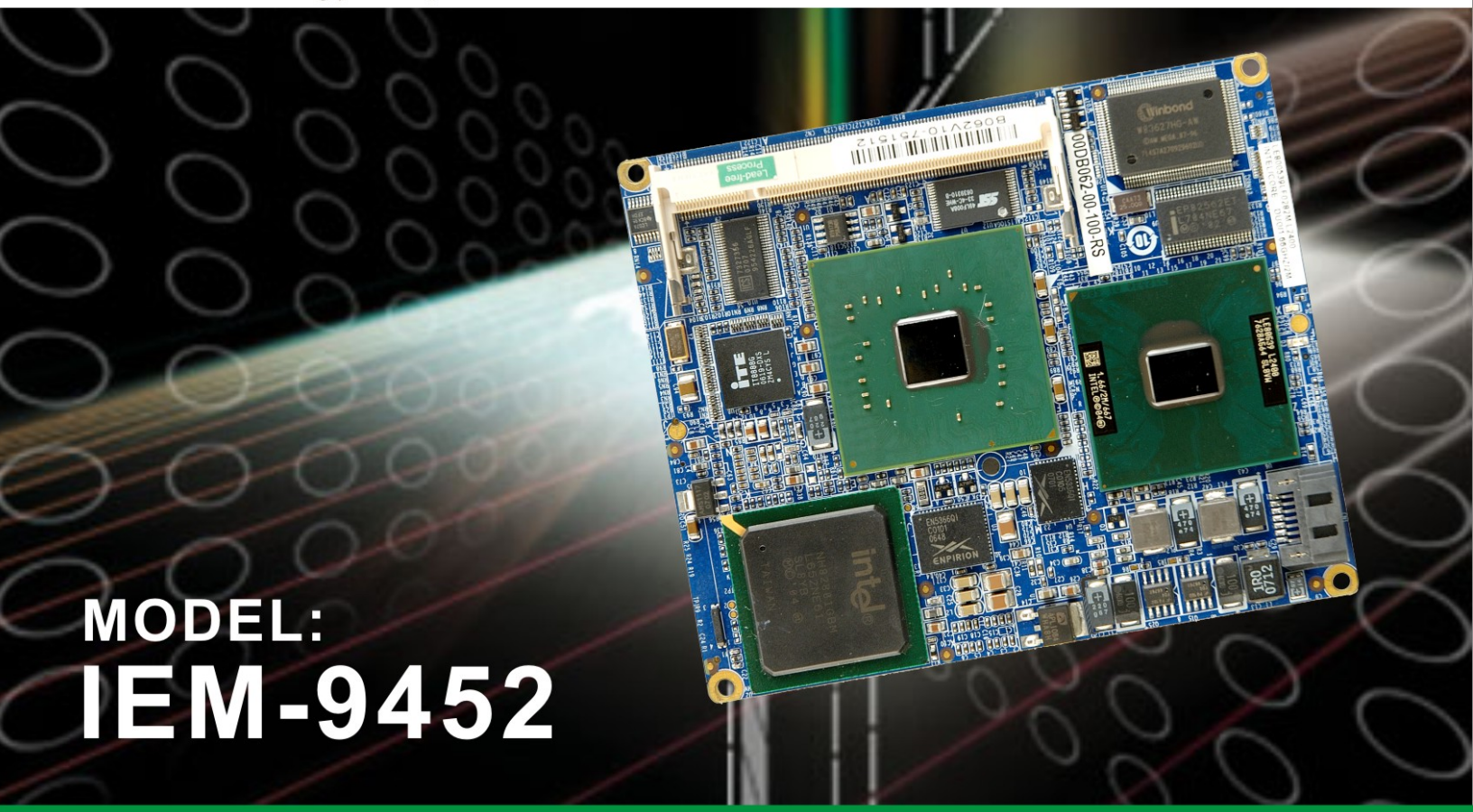
IEI Technology Corp.



MODEL:

IEM-9452

EXT CPU Module with Intel® Core™2 Duo/Celeron® M

CPU on-board, SATA, USB 2.0, RS-232, LAN and Audio

User Manual

Rev. 1.00 April 2008

RoHS Lead Free

Revision

Date	Version	Changes
2008-03	1.00	Initial release

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Manual Conventions

WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text. The text is the warning message. A warning message is shown below:

WARNING:

This is an example of a warning message. Failure to adhere to warning messages may result in permanent damage to the IEM-9452 or personal injury to the user. Please take warning messages seriously.

CAUTION!

Cautionary messages should also be heeded to help reduce the chance of losing data or damaging the IEM-9452. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed. The italicized text is the cautionary message. A caution message is shown below:

CAUTION:

This is an example of a caution message. Failure to adhere to cautions messages may result in permanent damage to the IEM-9452. Please take caution messages seriously.

NOTE:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,” both capitalized and bold and is followed by text. The text is the cautionary message. A note message is shown below:

NOTE:

This is an example of a note message. Notes should always be read. Notes contain critical information about the IEM-9452. Please take note messages seriously.

Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the IEM-9452 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

The items listed below should all be included in the IEM-9452 package.

- 1 x IEM-9452 single board computer
- 1 x Heat spreader
- 1 x Heat sink
- 1 x Utility CD
- 1 x QIG (quick installation guide)

Images of the above items are shown in **Chapter 3**.

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Chapter

1

Introduction

1.1 IEM-9452 Overview

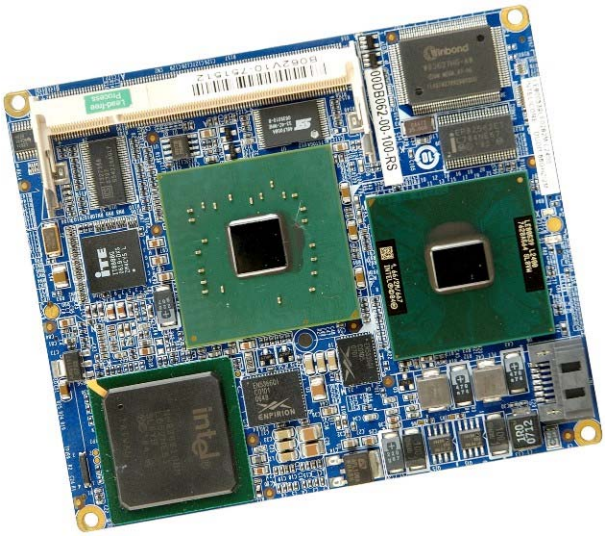


Figure 1-1: IEM-9452 ETX Embedded Module

The ETX (Embedded Technology eXtended) form factor IEM-9452 embedded module is fully equipped with an Intel® Core™2 Duo/Celeron® M CPU and with advanced multi-mode I/Os. The IEM-9452 embedded module is designed for flexible integration by system developers into customized platform devices.

1.1.1 Model Variations

There are three IEM-9452 models. They are listed below.

	CPU	L2 Cache	FSB	Processor #
IEM-9452-L7400	1.5 GHz Intel® Core™2 Duo	4 MB	667 MHz	L7400
IEM-9452-CM423	1.06 GHz Intel® Celeron® M	1 MB	533 MHz	423

Table 1-1: Model Variations

1.1.2 IEM-9452 Applications

The IEM-9452 is designed for being embedded in customized baseboards for flexible applications.

1.1.3 IEM-9452 Benefits

Some of the IEM-9452 embedded platform benefits include:

- Low power, high performance
- Easy integration into customized baseboards
- Easy upgrading
- Easy maintenance
- Easy design compatibility
- Low cost product development

1.1.4 IEM-9452 Features

Some of the IEM-9452 features are listed below:

- Complies with ETX form factor
- Complies with RoHS
- Embedded Intel® Core™2 Duo or Intel® Celeron M CPU
- Supports one DDR2 SDRAM SO-DIMM (system max. 2 GB)
- Supports VGA, 18-bit dual-channel LVDS
- Comes with one SATA connector
- Comes with one SDVO connector
- Support for four USB 2.0 devices
- Support for two RS-232 devices
- Support for four PCI cards

1.2 IEM-9452 Overview

An overview of the IEM-9452 embedded module can be seen in **Figure 1-2** and **Figure 1-3**.

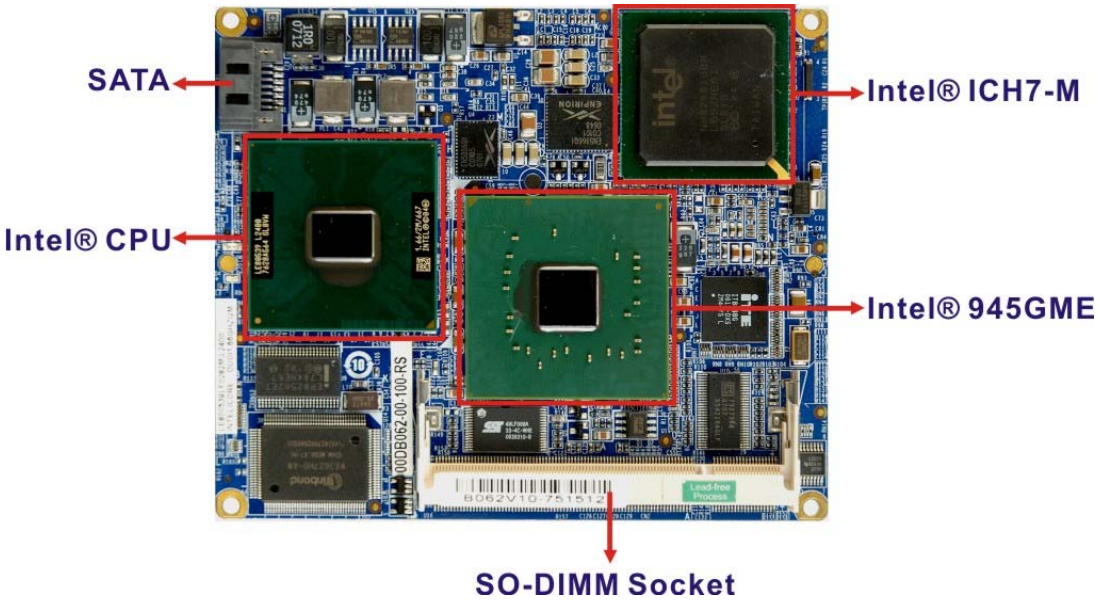


Figure 1-2: IEM-9452 Overview (Front Side)

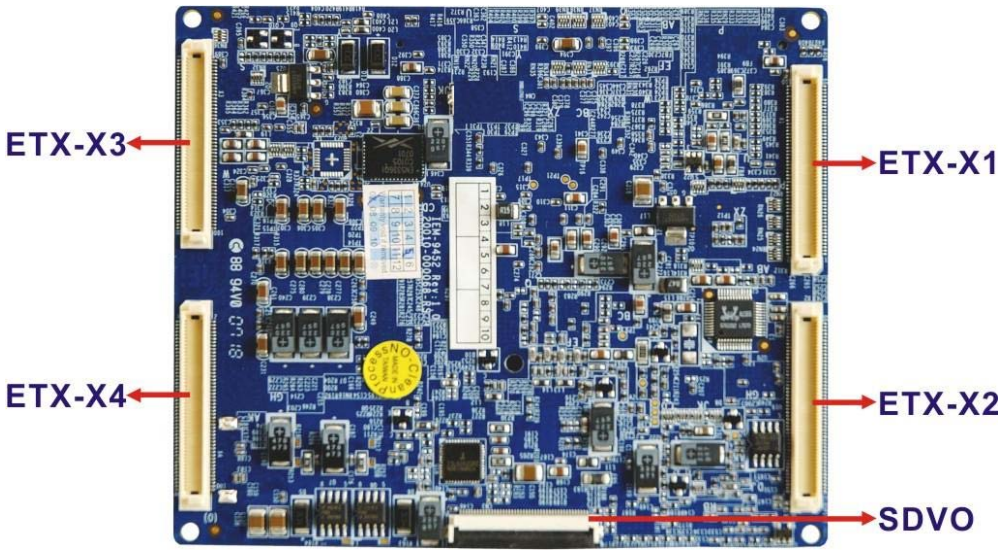


Figure 1-3: IEM-9452 Overview (Reverse Side)

1.2.1 IEM-9452 Connectors

The IEM-9452 has the following interface connectors on-board:

- 1 x ETX-X1 connector (reverse side)
- 1 x ETX-X2 connector (reverse side)
- 1 x ETX-X3 connector (reverse side)
- 1 x ETX-X4 connector (reverse side)
- 1 x SATA connector (front side)
- 1 x SO-DIMM socket (front side)

1.2.2 IEM-9452 IO Interface Support

The IEM-9452 embedded module supports the following IO interfaces on the baseboard:

- 2 x RS-232
- 4 x USB 2.0
- 1 x LPT/FDD
- 1 x KB/MS
- 1 x IDE
- 1 x IR
- 1 x CF Type II

1.2.3 Technical Specifications

IEM-9452 technical specifications are listed in **Table 1-2**. Detailed descriptions of each specification can be found in **Chapter 2**.

SPECIFICATION	IEM-9452-L7400	IEM-9452-CM423
CPUs Supported	1.5 GHz Intel® Core™2 Duo L7400 with a 667 MHz FSB	1.06 GHz Intel® Celeron® M 423 with a 533 MHz FSB
Cache Memory	4 MB L2 cache	1 MB L2 cache
System Chipset	Intel® 945GME	
I/O Controller	ICH7-M	

Memory	One 200-pin 667/533/400 MHz DDR2 SDRAM SO-DIMM (system max. 2GB)	
Super IO	Winbond W83627HG	
Display	CRT integrated in Intel® 945GME	
LVDS	18-bit dual channel LVDS integrated in Intel® 945GME	
HDD Interface	One IDE channel supports two Ultra ATA 100/66/33 devices	
Power Support	5 V only, AT/ATX power supported	
Power Consumption	+5 V @ 3.81 A (1.5 GHz Intel® Core™2 Duo L7400 with a 512 MB 667 MHz DDR2 SO-DIMM)	
Watchdog Timer	Software programmable supports 1~255 sec. system reset	
I/O Interfaces	2 x RS-232 4 x USB 2 .0 1 x LPT/FDD 1 x IR	1 x KB/MS 1 x IDE 1 x CF Type II 1 x SATA (on-board)
Expansion	4 x PCI 1 x ISA	
Ethernet	10/100 Mbps Intel® 82562ET Ethernet controller	
BIOS	AMI	
Dimensions	95 mm x 114 mm	
Weight	GW: 850 g; NW: 290 g	
Operating Temperature	Minimum: 0°C (32°F) Maximum: 60°C (140°F)	
Audio Interfaces	AC'97 Codec Realtek ALC655	

Table 1-2: Technical Specifications

Chapter

2

Detailed Specifications

2.1 Overview

This chapter describes the specifications and on-board features of the IEM-9452 in detail.

2.2 Dimensions

2.2.1 Board Dimensions

The dimensions of the board are listed below:

- **Length**: 95.01mm
- **Width**: 114mm

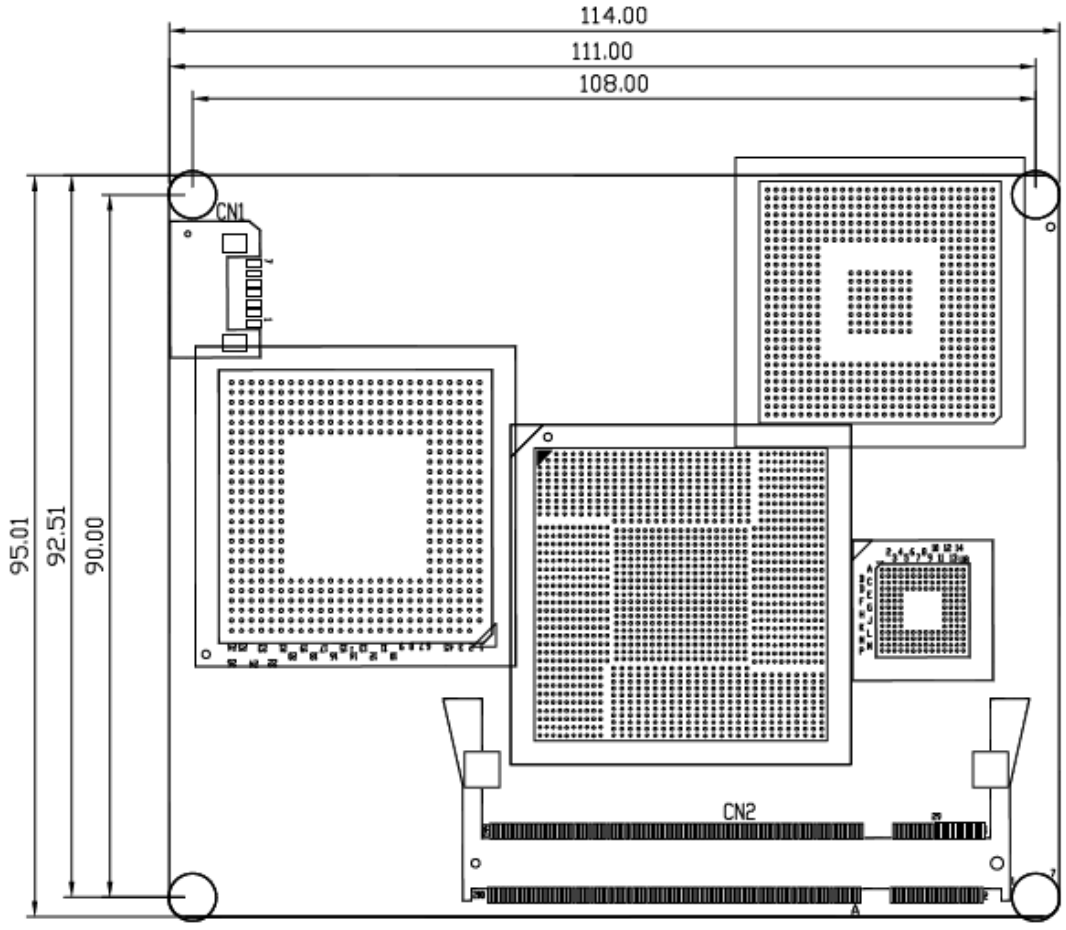


Figure 2-1: IEM-9452 Dimensions (mm)

2.3 Data Flow

Figure 2-2 shows the data flow between the two on-board chipsets and other components installed on the motherboard and described in the following sections of this chapter.

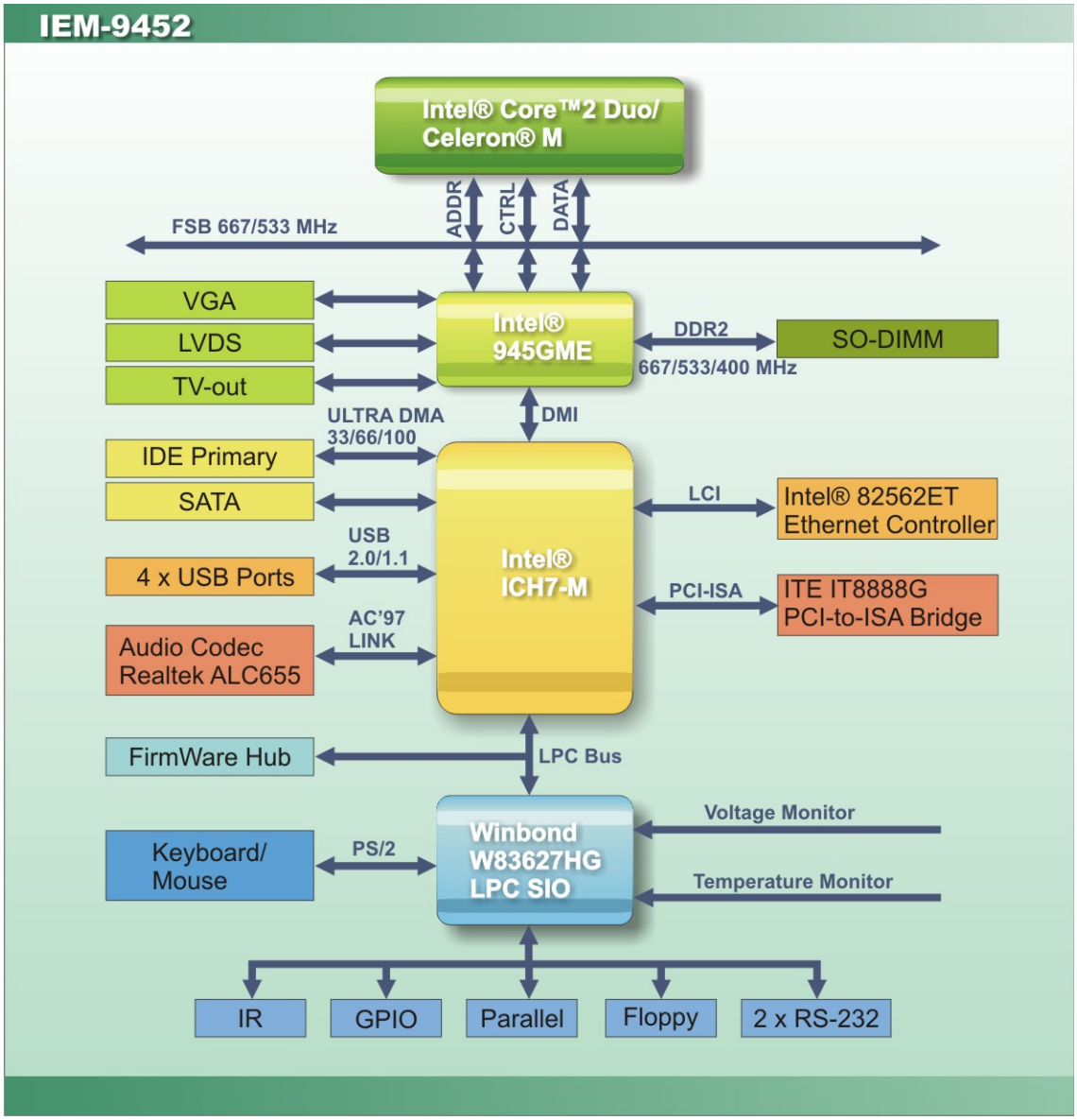


Figure 2-2: Data Flow Block Diagram

2.4 Compatible Processors

2.4.1 Compatible Processor Overview

The IEM-9452 supports the following processors:

- IEM-9452-L7400: Intel® Core™2 Duo processor
- IEM-9452-CM423: Intel® Celeron® M processor

All the above processors communicate with the Intel® 945GME Northbridge chipset through a 667 MHz or 533 MHz front side bus (FSB). The processor specifications are listed in **Table 2-1**.

Family	CPU Speed	Processor #	Bus Speed	Mfg Tech	Cache Size
Core™2 Duo	1.50 GHz	L7400	667 MHz	65 nm	4 MB L2
Celeron® M	1.06 GHz	423	533 MHz	65 nm	1 MB L2

Table 2-1: Supported Processors

2.5 Intel® 945GME Chipset Graphics Memory Controller Hub

2.5.1 Intel® 945GME Overview

The Intel® 945GME Northbridge chipset has the Generation 3.5 Intel Integrated Graphics Engine and the Intel® Graphics Media Accelerator 950 (Intel® GMA 950). The integrated graphics and memory controller hub (GMCH) facilitates the flow of information primarily between the following four interfaces:

- Front Side Bus (FSB)
- System Memory Interface
- Graphics Interface
- Direct Media Interface (DMI)

2.5.2 Intel® 945GME Memory Support

WARNING:

Only DDR2 memory module can be installed on the IEM-9452. Do not install DDR memory modules. If a DDR memory module is installed on the IEM-9452, the IEM-9452 may be irreparably damaged.

The Intel® 945GME Northbridge chipset on the IEM-9452 supports one 200-pin DDR2 SO-DIMM with the following features:

- One 200-pin SO-DIMM
- DDR2 only (**DO NOT** install a DDR SO-DIMM)
- Single-channel or dual-channel
- Capacities of 256 MB, 512 MB, 1 GB or 2 GB
- Transfer speeds of 400 MHz, 533 MHz or 667 MHz
- 64-bit wide per channel

The memory socket is shown in **Figure 2-3**.

Figure 2-3: 200-pin DDR2 SO-DIMM Socket

2.5.3 Intel® 945GME Integrated Graphics

The Intel® 945GME Northbridge chipset has an Intel® Gen. 3.5 integrated graphics engine that supports the following display devices:

- Analog CRT
- LVDS
- TV-Out

2.5.3.1 Intel® 945GME Analog CRT Support

The Intel® 945GME internal graphics engine, with an integrated 400 MHz RAMDAC and hot plug CRT support, supports analog CRT monitors up to QXGA. A DB-15 VGA connector on the baseboard is interfaced to the Intel® 945GME graphics engine.

2.5.3.2 Intel® 945GME LVDS Support

The Intel® 945GME internal graphics engine supports LVDS displays with the following features:

- Up to UXGA monitors with a maximum resolution of 1600 x 1200
- 18-bit 25 MHz to 112 MHz single-channel or dual-channel LVDS screens
- CPIS 1.5 compliant LVDS screens

2.5.3.3 Intel® 945GME TV Out Support

The Intel® 945GME internal graphics engine has the following TV output features:

- Three integrated 10-bit DACs
- Overscaling
- NTSC and PAL formats supported
- Supports RCA or S-VIDEO connectivity
- Supports HDTV with the following resolutions:
  - 480p
  - 720p
  - 1080i
  - 1080p

2.5.4 Intel® 945GME Direct Media Interface (DMI)

Intel® 945GME Northbridge GMCH is connected to the Intel® ICH7-M Southbridge Chipset through the chip-to-chip Direct Media Interface (DMI). Features of the Intel® 945GME DMI are listed below:

- 2GB/s (1GB/s in each direction) bus speed
- 32-bit downstream address

2.6 Intel® ICH7-M Southbridge Chipset

2.6.1 Intel® ICH7-M Overview

The Intel® ICH7-M Southbridge chipset is connected to the Intel® 945GME Northbridge GMCH through the chip-to-chip Direct Media Interface (DMI). Some of the features of the Intel® ICH7-M are listed below.

- Complies with PCI Express Base Specification, Revision 1.0a
- Complies with PCI Local Bus Specification, Revision 2.3 and supports 33MHz PCI operations
- Supports ACPI Power Management Logic
- Contains:
  - Enhanced DMA controller
  - Interrupt controller
  - Timer functions
- Integrated SATA host controller with DMA operations interfaced to one SATA connector on the IEM-9452
- Integrated IDE controller supports Ultra ATA 100/66/33
- Supports the four USB 2.0 devices on the baseboard with four UHCI controllers and one EHCI controller
- Complies with System Management Bus (SMBus) Specification, Version 2.0
- Supports Audio Codec ’97 (AC’97) Revision 2.3
- Contains Low Pin Count (LPC) interface
- Supports Firmware Hub (FWH) interface
- Serial peripheral interface support

2.6.2 Intel® ICH7-M Audio Codec ’97 Controller

The IEM-9452 has an integrated Realtek ALC655 codec. The ALC655 codec is a 16-bit, full-duplex AC'97 Rev. 2.3 compatible six-channel audio codec designed for PC multimedia systems, including host/soft audio and AMR/CNR-based designs. The codec is shown in **Figure 2-4**.

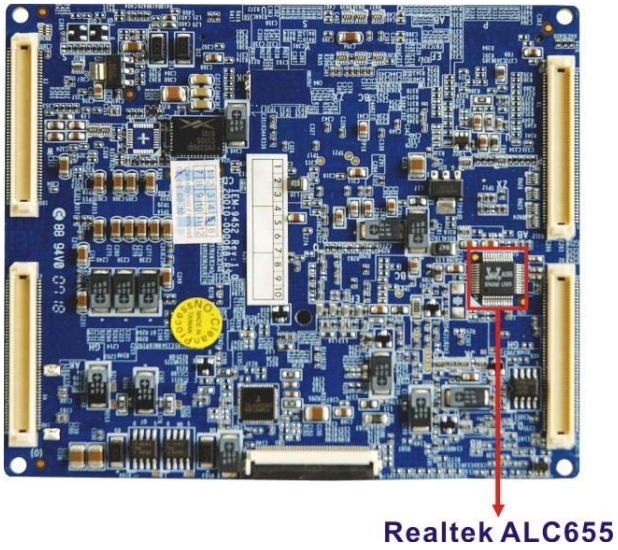


Figure 2-4:Realtek ALC655 Codec

Some of the features of the codec are listed below.

- Meets performance requirements for audio on PC99/2001 systems
- 16-bit Stereo full-duplex CODEC with 48KHz sampling rate
- Compliant with AC'97 Rev 2.3 specifications
- Front-Out, Surround-Out, MIC-In and LINE-In Jack Sensing
- 14.318MHz -> 24.576MHz PLL to eliminate crystal
- 12.288MHz BITCLK input
- Integrated PCBEEP generator to save buzzer
- Interrupt capability
- Three analog line-level stereo inputs with 5-bit volume control, LINE_IN, CD, AUX
- Power support: Digital: 3.3V; Analog: 3.3V/5V
- Standard 48-pin LQFP package

- EAX™ 1.0 & 2.0 compatible
- Direct Sound 3D™ compatible
- A3D™ compatible
- I3DL2 compatible
- HRTF 3D positional audio

2.6.3 Intel® ICH7-M Ethernet Connection

An integrated PHY on the Intel® ICH7-M Southbridge is interfaced to an Intel® 82562ET 10 Mbps or 100 Mbps Ethernet controller through the LCI bus. The Intel® 82562ET controller is then connected to the RJ-45 connector on the baseboard through the board-to-board connectors. See **Figure 2-5**.

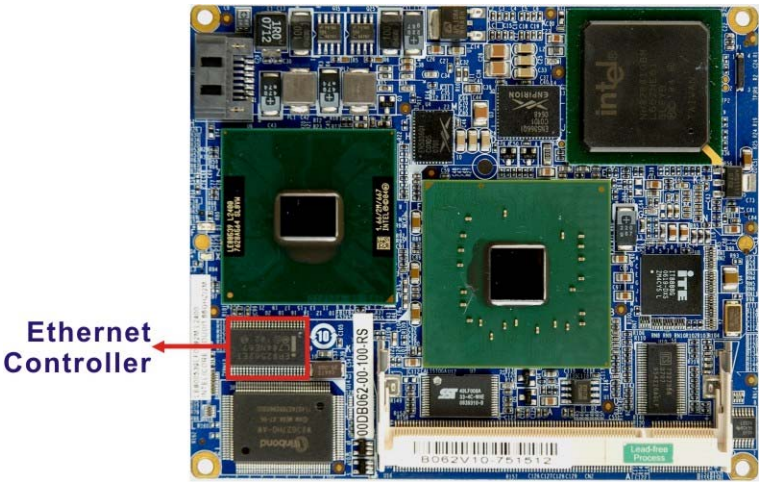


Figure 2-5: 10 Mbps or 100 Mbps LAN Controller Chipset

2.6.4 Intel® ICH7-M IDE Interface

The integrated IDE interface on the ICH7-M Southbridge supports two IDE hard disks and ATAPI devices through the 40-pin IDE connector on the baseboard. PIO IDE transfers up to 16 MB/s and Ultra ATA transfers of 100 MB/s. The integrated IDE interface is able to support the following IDE HDDs:

- **Ultra ATA/100**, with data transfer rates up to 100 MB/s
- **Ultra ATA/66**, with data transfer rates up to 66 MB/s
- **Ultra ATA/33**, with data transfer rates up to 33 MB/s

Specification	Ultra ATA/100	Ultra ATA/66	Ultra ATA/33
IDE devices	2	2	2
PIO Mode	0 – 4	0 – 4	0 – 4
PIO Max Transfer Rate	16.6 MB/s	16.6 MB/s	16.6 MB/s
DMA/UDMA designation	UDMA 3 - 4	UDMA 3 – 4	UDMA 2
DMA/UDMA Max Transfer	100 MB/s	66 MB/s	33 MB/s
Controller Interface	5V	5V	5V

Table 2-2: Supported HDD Specifications

2.6.5 Intel® ICH7-M Low Pin Count (LPC) Interface

The ICH7-M LPC interface complies with the LPC 1.1 specifications. The LPC bus from the ICH7-M is connected to the following components:

- BIOS chipset
- Super I/O chipset

2.6.6 Intel® ICH7-M PCI Interface

The PCI interface on the ICH7-M is compliant with the PCI Revision 2.3 implementation. Some of the features of the PCI interface are listed below.

- PCI Revision 2.3 compliant

- 33 MHz
- 5V tolerant PCI signals (except PME#)
- Integrated PCI arbiter supports up to seven PCI bus masters

2.6.7 Intel® ICH7-M Real Time Clock

256 bytes of battery backed RAM is provided by the Motorola MC146818A real time clock (RTC) integrated into the ICH7-M. The RTC operates on a 3V battery and 32.768KHz crystal. The RTC keeps track of the time and stores system data even when the system is turned off.

2.6.8 Intel® ICH7-M SATA Controller

The integrated SATA controller on the ICH7-M Southbridge supports one SATA drive on the IEM-9452 with independent DMA operations. SATA controller specifications are listed below.

- Supports one SATA drive
- Supports 1.5 Gb/s data transfer speeds
- Supports Serial ATA Specification, Revision 1.0a

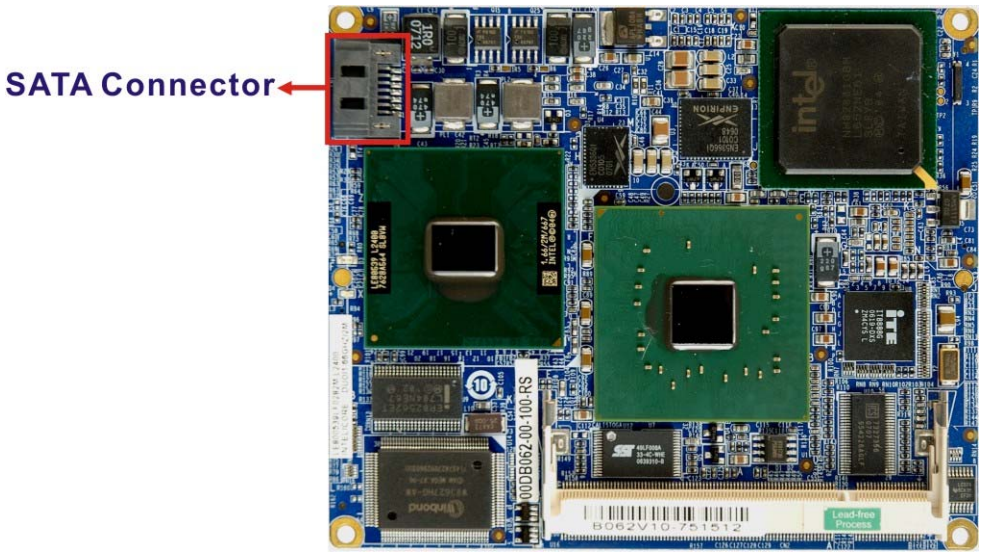


Figure 2-6: SATA Connector

2.6.9 Intel® ICH7-M USB Controller

Up to four high-speed, full-speed or low-speed USB devices are supported by the ICH7-M on the IEM-9452. High-speed USB 2.0, with data transfers of up to 480MB/s, is enabled with the ICH7-M integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the ICH7-M integrated Universal Host Controller Interface (UHCI) controllers.

The four USB ports implemented on the IEM-9452 are connected to two internal connectors on the IEM-DB-7S-RS baseboard.

2.7 LPC Bus Components

2.7.1 LPC Bus Overview

The LPC bus is connected to components listed below:

- BIOS chipset
- Super I/O chipset

2.7.2 BIOS Chipset

The BIOS chipset has a licensed copy of AMI BIOS installed on the chipset. Some of the BIOS features are listed below:

- AMI Flash BIOS
- SMIBIOS (DMI) compliant
- Console redirection function support
- PXE (Pre-boot Execution Environment) support
- USB booting support

The BIOS chipset is shown in **Figure 2-7** below.

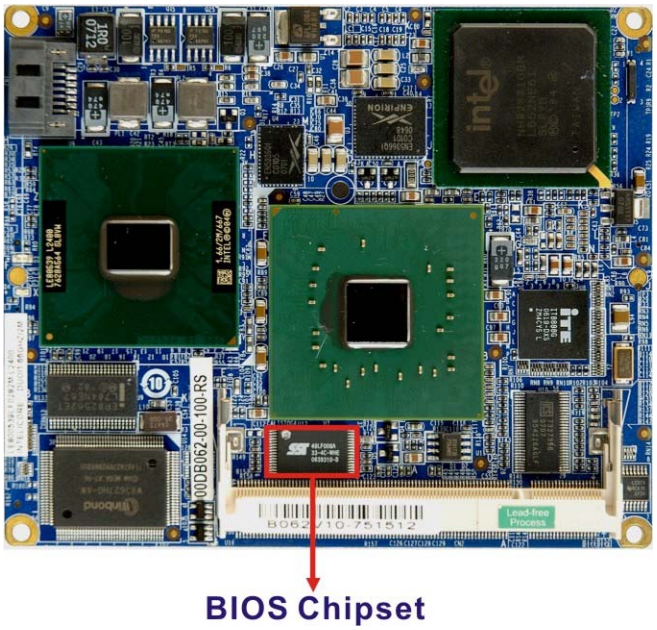


Figure 2-7: BIOS Chipset

2.7.3 Super I/O chipset

The Winbond W83627HG Super I/O chipset is connected to the ICH7-M Southbridge through the LPC bus.

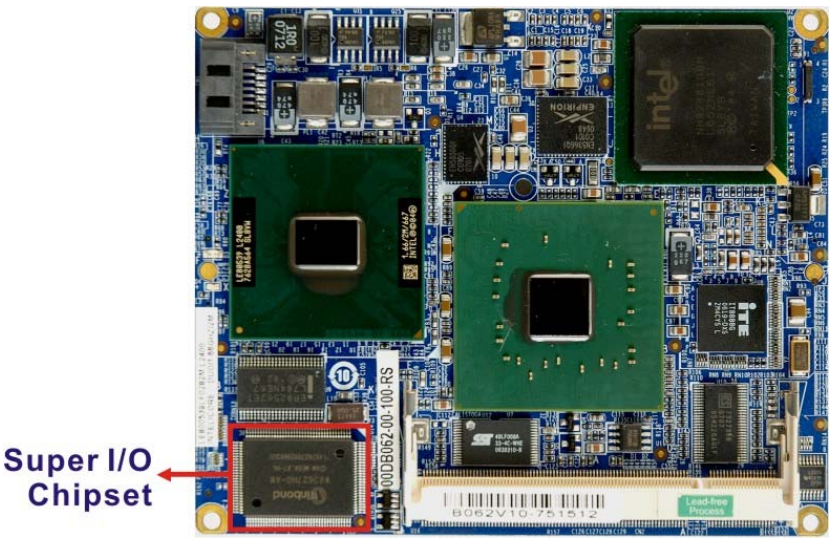


Figure 2-8: Super I/O Chipset

The Winbond W83627HG is an LPC interface-based Super I/O device that comes with Environment Controller integration, floppy disk controller, UART controller and IR controller. Some of the features of the Winbond W83697HG chipset are listed below:

- LPC Spec. 1.01 compliant
- LDRQ# (LPC DMA) and SERIRQ (serial IRQ) supported
- Hardware monitor functions integrated
- Microsoft PC98/PC99 Hardware Design Guide compliant
- ACPI DPM (Device Power Management) supported

Some of the Super I/O features are described in more detail below:

2.7.3.1 Super I/O LPC Interface

The LPC interface on the Super I/O complies with the Intel® Low Pin Count Specification Rev. 1.01. The LPC interface supports both LDRQ# and SERIRQ protocols as well as PCI PME# interfaces.

2.7.3.2 Super I/O Infrared

The onboard Super I/O supports the following infrared specifications:

- IrDA version 1.0 SIR protocol with a maximum baud rate up to 115.2Kbps

The IR controller on the super I/O is interfaced through an IR pin-header on a baseboard.

2.7.3.3 Super I/O Hardware Monitor Functions

The Super I/O Hardware Monitor monitors internal voltages, system temperature and the cooling fan speed. All the monitored environmental parameters can be read from the BIOS Hardware Health Configuration menu.

2.7.3.4 Super I/O Parallel Port

The Super I/O parallel port (LPT) is compatible with the following LPT specifications.

- IBM parallel port compatible
- PS/2 compatible bi-directional parallel port

- Enhanced Parallel Port (EPP) mode supported. Compatible with IEEE 1284 specifications
- Extended Parallel Port (EPP) mode supported. Compatible with IEEE 1284 specifications
- Enhanced printer port back-drive current protection

The parallel port controller is connected to an external DB-26 LPT connector on a baseboard.

2.7.3.5 Super I/O Floppy Disk Drive (FDD) Controller

The Super I/O FDD controller is compatible with the following specifications.

- IBM PC AT disk drive compatible
- Variable write pre-compensation with track selectable capability
- Vertical recording format supported
- DMA logic enabled
- 16-byte data FIFOs
- Overrun and under run conditions detected
- Built-in address mark detection circuitry to simplify the read electronics
- FDD anti-virus functions with software write protect and FDD write enable signal
- Supports 3.5-inch or 5.25-inch FDD
- Compatible with industry standard 82077
- Supported capacities:
  - 360K
  - 720K
  - 1.2M
  - 1.44M
  - 2.88M
- Supported transfer rates
  - 250Kbps
  - 300Kbps
  - 500Kbps
  - 1Mbps
  - 2Mbps

- 3-mode FDD supported

The FDD controller is interfaced to a FDD connector on the baseboard through the board-to-board connectors.

2.7.3.6 Super I/O Keyboard and Mouse Controller

The Super I/O keyboard and mouse controller is compatible with the following specifications.

- 8042 compatible
- Asynchronous access to two data registers and one status register
- Compatible with 8042 software
- PS/2 mouse supported
- Port 92 supported
- Interrupt and polling modes supported
- Fast Gate A20 and Hardware Keyboard Reset
- 8-bit timer/counter

The keyboard and mouse controller is interfaced to a keyboard and mouse connected to the connector on a baseboard.

2.8 PCI Bus Components

2.8.1 PCI Bus Overview

The PCI bus is connected to the component listed below:

- ITE IT8888G PCI-to-ISA bridge

The PCI bus complies with PCI Local Bus Specification, Revision 2.2 and supports 33MHz PCI operations.

2.8.1.1 ITE IT8888G PCI-to-ISA Bridge

An ITE IT8888G PCI to ISA bridge single function device enables legacy ISA card expansion on the baseboard. The PCI to ISA bridge is shown in **Figure 2-9**.

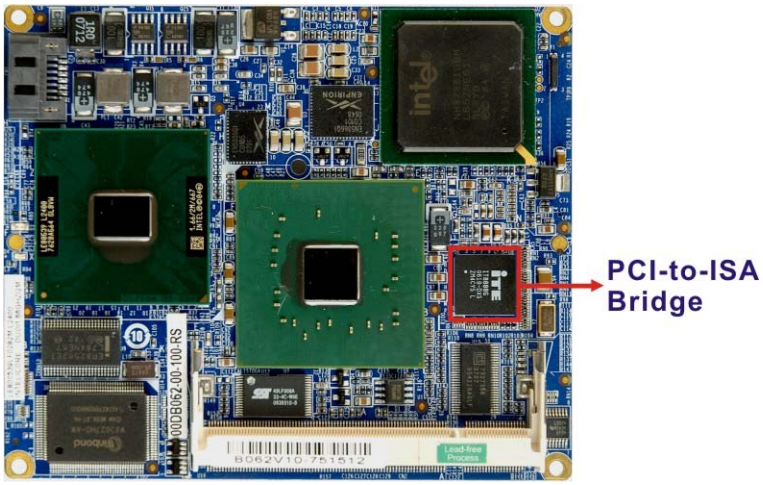


Figure 2-9: PCI-to-ISA Bridge

The IT8888G has a PCI specification v2.1 compliant 32-bit PCI bus interface and supports both PCI Bus master and slave. The PCI interface supports both programmable positive and full subtractive decoding schemes. Some of the features of the IT8888G PCI to ISA bridge are listed below.

- PCI Interface
- Programmable PCI Address Decoders
- PC/PCI DMA Controller
- Distributed DMA Controller
- ISA Interface
- SM Bus
- 1 analog line-level mono output: MONO_OUT
- Power-on Serial Bus Configuration
- Serial IRQ
- Versatile power-on strapping options
- Supports NOGO function
- Single 33 MHz Clock Input
- +3.3V PCI I/F with +5V tolerant I/O buffers
- +5V ISA I/F and core Power Supply

2.9 Environmental and Power Specifications

2.9.1 System Monitoring

Two thermal inputs on the IEM-9452 Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- System temperature
- CPU temperature

Five voltage inputs on the IEM-9452 Super I/O Enhanced Hardware Monitor monitor the following voltages:

- CPU
- Memory
- +3.3Vin
- +5.0Vin
- +5VSB

2.9.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the IEM-9452 are listed below.

- Minimum Operating Temperature: 0ºC (32°F)
- Maximum Operating Temperature: 60°C (140°F)

A cooling fan and heat sink must be installed on the CPU. Thermal paste must be smeared on the lower side of the heat sink before it is mounted on the CPU. Heat sinks are also mounted on the Northbridge and Southbridge chipsets to ensure the operating temperature of these chips remain low.

2.9.3 Power Consumption

Table 2-3 shows the power consumption parameters for the IEM-9452 running with a 1.5GHz Intel® Core™2 Duo L7400 processor and with a 512 MB, 667 MHz DDR2 SO-DIMM.

Voltage	Current
+5 V	3.81 A

Table 2-3: Power Consumption

2.10 IEM-DB-7S-RS Compatible Baseboard

The IEI IEM-DB-7S-RS compatible baseboard can be separately purchased from IEI. The

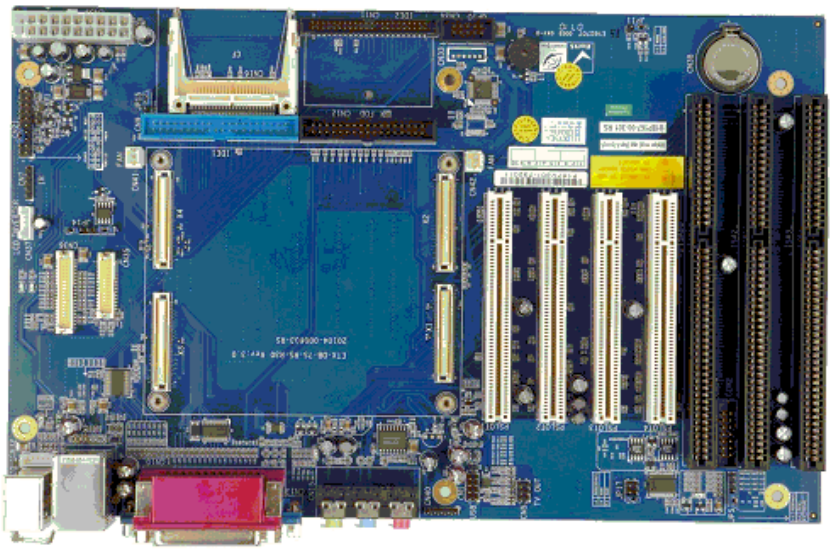


Figure 2-10: IEM-DB-7S-RS Compatible Baseboard

Some of the features of the IEM-DB-7S-RS are listed below:

- **Display Interfaces**:
  - 1 x 30-pin 48-bit DFP for LVDS
  - 1 x 40-pin connector for 24-bit TTL
- **Expansion Interfaces**:
  - 4 x PCI slots
  - 3 x ISA slots
- **External Peripheral Interface Connectors**:
  - 3 x Audio jacks
  - 2 x PS/2 connectors (one for mouse, one for keyboard)
  - 1 x RJ-45 Ethernet connector

- 2 x USB 2.0 port connectors
- 1 x male DB-9 COM connector
- 1 x female DB-15 VGA connector
- 1 x female DB-26 LPT connector

- **Onboard interface connectors**:
  - 2 x IDE connectors (one 40-pin box-header, one 44-pin box-connector) (IEM-9452 only supports one 40-pin IDE connector)
  - 1 x FDD connector (26-pin box-header connector)
  - 1 x Digital I/O connector (10-pin header, 4-bits input/4-bits output)
  - 1 x Infrared connector (5-pin header)
  - 1 x CF Type I/II socket
  - 1 x ATX connector

For more information about the IEM-DB-7S-RS compatible baseboard or customized baseboard options, please contact an IEI sales representative at sales@iei.com.tw.

Chapter

3

Unpacking

3.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the IEM-9452 may result in permanent damage to the IEM-9452 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IEM-9452. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IEM-9452, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***: - Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: - When configuring the IEM-9452, place it on an antic-static pad. This reduces the possibility of ESD damaging the IEM-9452.
- ***Only handle the edges of the PCB***: - When handling the PCB, hold the PCB by the edges.

3.2 Unpacking

3.2.1 Unpacking Precautions

When the IEM-9452 is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 3.1**.
- Make sure the packing box is facing upwards so the IEM-9452 does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

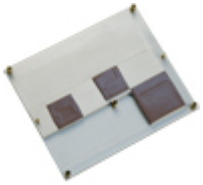
3.3 Unpacking Checklist

Note:

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the IEM-9452 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

3.3.1 Package Contents

The IEM-9452 is shipped with the following components:

Quantity	Item and Part Number	Image
1	IEM-9452	
1	Heat spreader (**P/N**: 34000-000183-RS)	
1	Heat sink (for IEM-9452-CM423 only) (**P/N**: 34000-000180-RS)	
1	Heat sink with fan (for IEM-9452-L7400 only) (**P/N**: 19100-000074-RS)	

1	Quick installation guide	
1	Utility CD	

Table 3-1: Package List Contents

Chapter

4

Connector Pinouts

4.1 Board-to-Board Interface Connectors

Section 4.1.1 shows board-to-board interface connector locations. **Section 4.1.2** lists all the peripheral interface connectors seen in **Section 4.1.2**.

4.1.1 IEM-9452 Layout

Figure 4-1 shows the on-board board-to-board connectors.

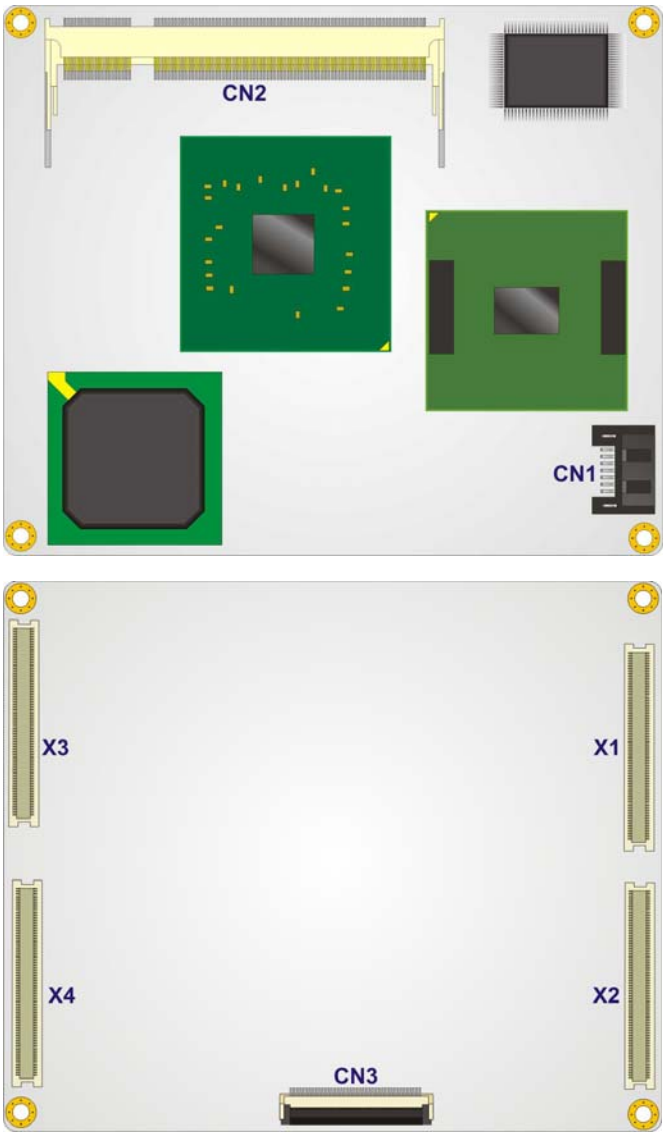


Figure 4-1: IEM-9452 Layout (Front side on the top, solder side on the bottom)

4.1.2 Board-to-Board Interface Connectors

Table 4-1 shows a list of the board-to-board interface connectors on the IEM-9452. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
ETX-X1 connector	100-pin ETX connector	X1
ETX-X2 connector	100-pin ETX connector	X2
ETX-X3 connector	100-pin ETX connector	X3
ETX-X4 connector	100-pin ETX connector	X4
SATA connector	7-pin SATA connector	CN1
SDVO connector	45-pin connector	CN3

Table 4-1: Peripheral Interface Connectors

4.2 Board-to-Board Peripheral Connectors

Board-to-board connectors are found on the ETX module and are only accessible when the ETX module is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the IEM-9452.

4.2.1 ETX-X1 Connector

CN Label: **X1**

CN Type: 100-pin ETX connector

CN Location: See **Figure 4-2**

CN Pinouts: See **Table 4-2**

The standard ETX-X1 connector locations and pinouts are shown below.

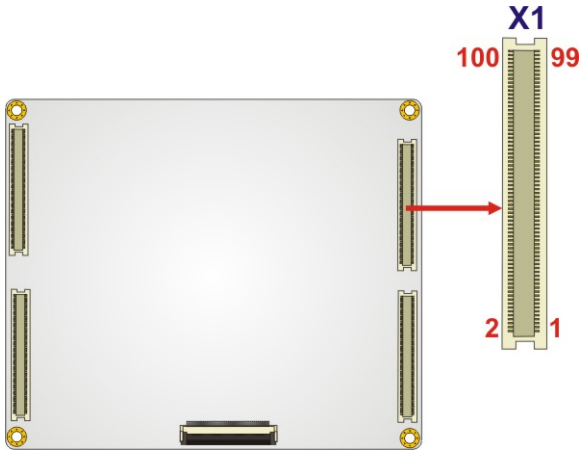


Figure 4-2: ETX-X1 Connector Pinouts

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	VCC5	52	VCC5
3	PCICLK2	4	PCICLK3	53	PAR	54	SERR#
5	GND	6	GND	55	PERR#	56	NC
7	PCICLK0	8	PCICLK1	57	PME#	58	USBP2N
9	PREQ3#	10	PGNT3#	59	PLOCK#	60	DEVSEL#
11	PGNT2#	12	VCC3	61	TRDY#	62	USBP3N
13	PREQ2#	14	GNT1#	63	IRDY#	64	STOP#
15	PREQ1#	16	VCC3	65	FRAME#	66	USBP2P
17	PGNT0#	18	NC	67	GND	68	GND
19	VCC5	20	VCC5	69	AD16	70	CBE2#
21	SERIRQ	22	PREQ0#	71	AD17	72	USBP3P
23	AD0	24	VCC3	73	AD19	74	AD18
25	AD1	26	AD2	75	AD20	76	USBP0N
27	AD4	28	AD3	77	AD22	78	AD21
29	AD6	30	AD5	79	AD23	80	USBP1N
31	C_BE0#	32	AD7	81	AD24	82	CBE3#
33	AD8	34	AD9	83	VCC5	84	VCC5
35	GND	36	GND	85	AD25	86	AD26

37	AD10	38	LINEIN_L	87	AD28	88	USBP0P
39	AD11	40	MICIN	89	AD27	90	AD29
41	AD12	42	LINE_R	91	AD30	92	USBP1P
43	AD13	44	VCC5_AUDIO	93	ICH_PCIRST#	94	AD31
45	AD14	46	LINE_OUTL	95	PIRQ#C	96	PIRQ#D
47	AD15	48	AUDIO_GND	97	PIRQ#A	98	PIRQ#B
49	C_BE1#	50	LINE_OUTR	99	GND	100	GND

Table 4-2: ETX-X1 Connector Pinouts

4.2.2 ETX-X2 Connector

CN Label: **X2**

CN Type: 100-pin ETX connector

CN Location: See **Figure 4-3**

CN Pinouts: See **Table 4-3**

The standard ETX-X2 connector locations and pinouts are shown below.

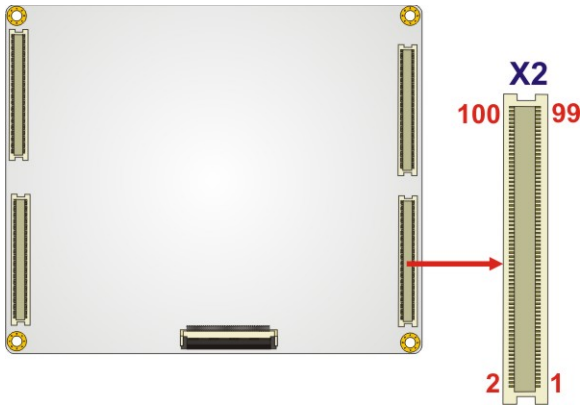


Figure 4-3: ETX-X2 Pinout Locations

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	VCC5	52	VCC5
3	SD14	4	SD15	53	SA6	54	IRQ5
5	SD13	6	MASTER#	55	SA7	56	IRQ6
7	SD12	8	DREQ7	57	SA8	58	IRQ7
9	SD11	10	DACK7#	59	SA9	60	ISACLK
11	SD10	12	DREQ6	61	SA10	62	REFRESH#
13	SD9	14	DACK6#	63	SA11	64	DREQ1
15	SD8	16	DREQ5	65	SA12	66	DACK1#
17	MEMW#	18	DACK5#	67	GND	68	GND
19	MEMR#	20	DREQ0	69	SA13	70	DREQ3
21	SA17	22	DACK0#	71	SA14	72	DACK3#
23	SA18	24	IRQ14	73	SA15	74	IOR#
25	SA19	26	IRQ15	75	SA16	76	IOW#
27	LA20	28	IRQ12	77	SA18	78	SA17
29	LA21	30	IRQ11	79	SA19	80	SMEMR#
31	LA22	32	IRQ10	81	IOCHRDY	82	AEN
33	LA23	34	IOCS16#	83	VCC5	84	VCC5
35	GND	36	GND	85	SD0	86	SMEMW#
37	SBHE#	38	MCS16-	87	SD2	88	SD1
39	SA0	40	OSCISA	89	SD3	90	NOWS#
41	SA1	42	BALE	91	DREQ2	92	SD4
43	SA1	44	TC	93	SD5	94	IRQ9
45	SA3	46	DACK2#	95	SD6	96	SD7
47	SA4	48	IRQ3	97	IOCHCK#	98	RSTDRV
49	SA5	50	IRQ4	99	GND	100	GND

Table 4-3: ETX-X2 Connector Pinouts

4.2.3 ETX-X3 Connector

CN Label: **X3**

CN Type: 100-pin ETX connector

CN Location: See **Figure 4-4**

CN Pinouts: See **Table 4-4**

The standard ETX-X3 connector locations and pinouts are shown below.

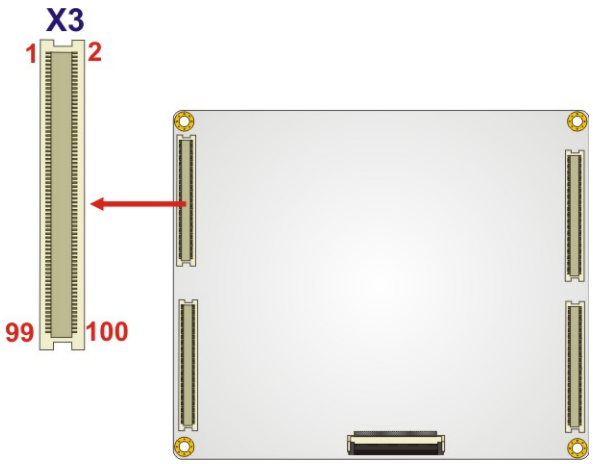


Figure 4-4: ETX-X3 Pinout Locations

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	LPT/FLPY#	52	NC
3	CRT_RED	4	CRT_BLUE	53	VCC5	54	GND
5	H_SYNC	6	CRT_GREEN	55	STROBE#	56	ALF#
7	V_SYNC	8	DDCA_CLK	57	RESERVED	58	PD7
9	N/C	10	DDCA_DATA	59	IR_RX	60	ERROR#
11	LVDS_CLKB#	12	LVDS_DBN3	61	IR_TX	62	PD6
13	LVDS_ CLKB#	14	LVDS_DBP3	63	RXD1	64	PAR_IN#
15	GND	16	GND	65	GND	66	GND
17	LVDS_DBP1	18	LVDS_DBP2	67	RTS#1	68	PD5

19	LVDS_DBN1	20	LVDS_DBN2	69	DTR#1	70	SLCTIN#
21	GND	22	GND	71	DCD#1	72	PD4
23	LVDS_DAN3	24	LVDS_DBP0	73	DSR#1	74	PD3
25	LVDS_DAP3	26	LVDS_DBN0	75	CTS#1	76	PD2
27	GND	28	GND	77	TXD1	78	PD1
29	LVDS_DAN2	30	LVDS_CLKA	79	RI#1	80	PD0
31	LVDS_DAP2	32	LVDS_CLKA#	81	VCC5	82	VCC5
33	GND	34	GND	83	RXD0	84	ACK#
35	LVDS_DAP0	36	LVDS_DAP1	85	RTS#0	86	BUSY
37	LVDS_DAN0	38	LVDS_DAN1	87	DTR#0	88	PE
39	VCC5	40	VCC5	89	DCD#0	90	SLCT
41	L_DDC_DATA	42	N/C	91	DSR#0	92	MCLK
43	L_DDC_CLK	44	LCD_BKLEN	93	CTS#0	94	MDAT
45	N/C	46	LCD_EN	95	TXD0	96	KCLK
47	TVBLUE_CVBS	48	TVGREEN_Y	97	RI#0	98	KDAT
49	N/C	50	TVRED_C	99	GND	100	GND

Table 4-4: ETX-X3 Connector Pinouts

4.2.4 ETX-X4 Connector

CN Label: **X4**

CN Type: 100-pin ETX connector

CN Location: See **Figure 4-5**

CN Pinouts: See **Table 4-5**

The standard ETX-X4 connector locations and pinouts are shown below.

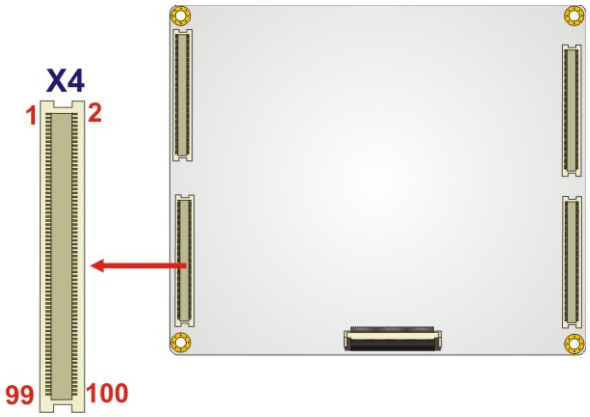


Figure 4-5: ETX-X4 Connector Pinout Locations

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	GND	2	GND	51	NC	52	PDIOR#
3	VCC5SBY	4	HW_RST	53	NC	54	PDIOW#
5	PS_ON	6	ICH_SPEAKER	55	NC	56	PDREQ
7	BWRTN	8	RTCBAT	57	NC	58	PDD15
9	NC	10	LILED#	59	NC	60	PDD0
11	WDTO#	12	ACTLED#	61	NC	62	PDD14
13	NC	14	SPLED#	63	NC	64	PDD1
15	NC	16	I2CLK	65	GND	66	GND
17	VCC5	18	VCC5	67	NC	68	PDD13
19	USB_OC#0	20	NC	69	NC	70	PDD2
21	ETX_SMI#	22	I2DAT	71	NC	72	PDD12
23	SMBCLK	24	SMBDATA	73	NC	74	PDD3
25	NC	26	SMBALERT#	75	NC	76	PDD11
27	NC	28	N/C	77	NC	78	PDD4
29	NC	30	PDCS#3	79	NC	80	PDD10
31	NC	32	PDCS#1	81	VCC5	82	VCC5
33	GND	34	GND	83	NC	84	PDD5
35	NC	36	PDA2	85	NC	86	PDD9
37	NC	38	PDA0	87	NC	88	PDD6

39	NC	40	PDA1	89	ICH_RI#	90	IDE_PATADET
41	PM_BATLOW	42	NC	91	RX-	92	PDD8
43	NC	44	IRQ14	93	RX+	94	NC
45	NC	46	PDDACK#	95	TX-	96	PDD7
47	NC	48	PIORDY	97	TX+	98	PCIRST#
49	VCC5	50	VCC5	99	GND	100	GND

Table 4-5: ETX-X4 Connector Pinouts

4.2.5 SATA Drive Connector

CN Label: **CN1**

CN Type: 7-pin SATA drive connector

CN Location: See **Figure 4-6**

CN Pinouts: See **Table 4-6**

The SATA drive connector is connected to a first generation SATA drive. First generation SATA drives transfer data at speeds as high as 150Mb/s.

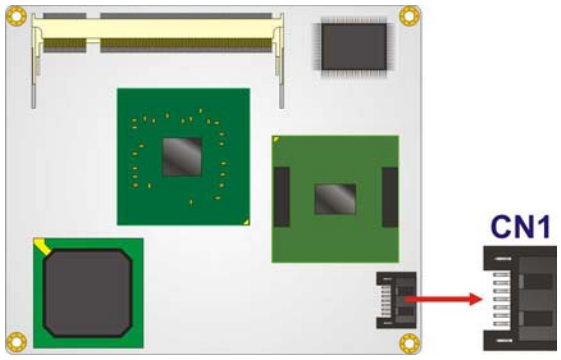


Figure 4-6: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TX+
3	TX-

4	GND
5	RX-
6	RX+
7	GND

Table 4-6: SATA Drive Connector Pinouts

4.2.6 SDVO Connector

CN Label: **CN3**

CN Type: 45-pin crimp (1x45)

CN Location: See **Figure 4-7**

CN Pinouts: See **Table 4-7**

The 45-pin SDVO (Serial Digital Video Out) connector supports additional video signaling interfaces.

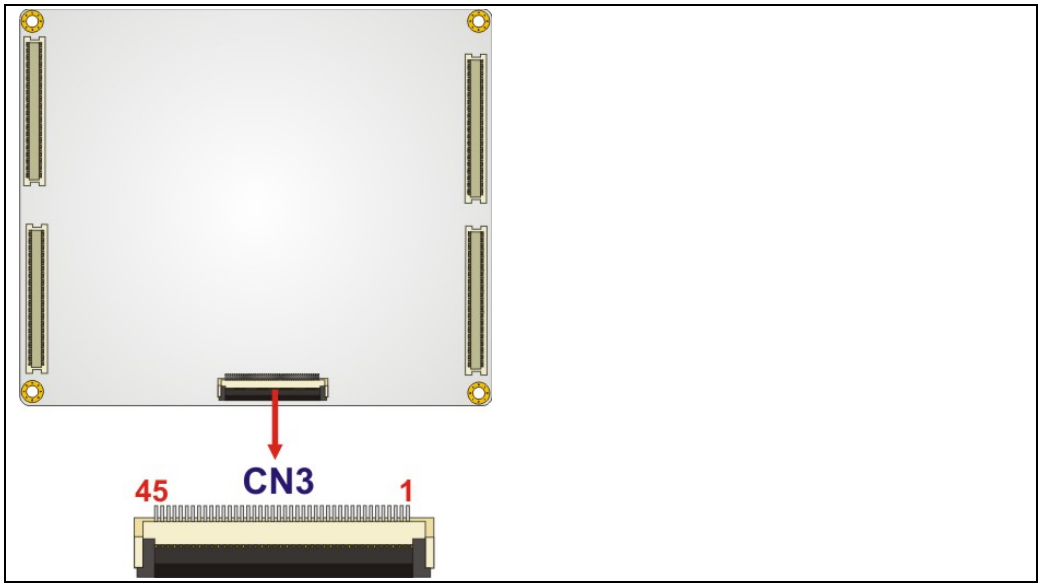


Figure 4-7: SDVO Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	24	SDVOC_RED
2	SDVOC_CLK#	25	GROUND
3	SDVOC_CLK	26	SDVOB_BLUE#
4	GROUND	27	SDVOB_BLUE
5	SDVOC_GREEN#	28	GROUND
6	SDVOC_GREEN	29	SDVOB_RED#
7	GROUND	30	SDVOB_RED
8	SDVOB_CLK#	31	GROUND
9	SDVOB_ CLK	32	SDVO_FLDSTALL#
10	GROUND	33	SDVO_FLDSTALL
11	SDVOB_GREEN#	34	GROUND
12	SDVOB_GREEN	35	SDVO_TVCLKIN#
13	GROUND	36	SDVO_TVCLKIN
14	SDVOC_INT#	37	GROUND
15	SDVOC_INT	38	SDVO_CLK
16	GROUND	39	SDVO_DATA
17	SDVOB_INT#	40	PCIRST#1
18	SDVOB_INT	41	VCC5
19	GROUND	42	VCC5
20	SDVOC_BLUE#	43	VCC5
21	SDVOC_BLUE	44	NC
22	GROUND	45	NC
23	SDVOC_RED#		

Table 4-7: SDVO Connector Pinouts

Chapter

5

Installation

5.1 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before the CPU module is installed. All installation notices pertaining to the installation of the CPU module should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the CPU module and injury to the person installing the CPU module.

5.1.1 Installation Notices

Before and during the installation of the IEM-9452, please do the following:

- Read the user manual
  - The user manual provides a complete description of the IEM-9452, installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD)
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Turn off all power to the IEM-9452
  - When working with the CPU module, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the IEM-9452 DO NOT:

- remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- use the product before verifying all the cables and power connectors are properly connected.
- allow screws to come in contact with the PCB circuit, connector pins, or its

components.

5.2 Unpacking

NOTE:

If any of the items listed below are missing when the IEM-9452 is unpacked, do not proceed with the installation and contact the IEM-9452 reseller or vendor.

5.2.1 Unpacking Precautions

Before installing the IEM-9452, unpack the CPU module. Some components on IEM-9452 are very sensitive to static electricity and can be damaged by a sudden rush of power. To protect it from being damaged, follow these precautions:

- The user should ground them self to remove any static charge before touching the IEM-9452. To do so wear a grounded wrist strap at all times or frequently touch any conducting materials that is connected to the ground.
- Handle the IEM-9452 by its edges. Do not touch the IC chips, leads or circuitry if not necessary.

Do not place a PCB on top of an anti-static bag. Only the inside of the bag is safe from static discharge.

5.2.2 Checklist

When unpacking the IEM-9452, please make sure that the package contains the following items.

- 1 x IEM-9452 CPU module
- 1 x Heat spreader
- 1 x Heat sink
- 1 x Utility CD

- 1 x QIG

If one or more of these items are missing, please contact the reseller or vendor the IEM-9452 was purchased from and do not proceed any further with the installation.

5.3 IEM-9452 Embedded Module Installation

WARNING!

Never run the embedded module without an appropriate heat sink.

WARNING!

Please note that the installation instructions described in this manual should be carefully followed in order to avoid damage to the CPU module components and injury to the user.

WARNING!

When installing electronic components onto the embedded module or installing the embedded module onto the baseboard, always take anti-static precautions in order to prevent ESD damage to the CPU module and other electronic components like the CPU and SO-DIMM module.

The following components must be installed onto the CPU module or connected to the CPU module during the installation process.

NOTE:

The IEM-9452 embedded module already has a preinstalled Intel® CPU.

- SO-DIMM module
- Mount the embedded module onto a baseboard
- Install the heat sink

5.3.1 SO-DIMM Installation

WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the IEM-9452. Please make sure the purchased SO-DIMM complies with the memory specifications of the IEM-9452. SO-DIMM specifications compliant with the IEM-9452 are listed in **Chapter 2**.

To install a SO-DIMM into a SO-DIMM socket, please follow the steps below and refer to **Figure 5-1**.

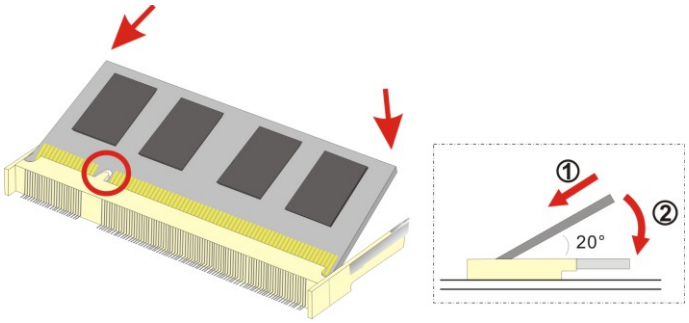


Figure 5-1: SO-DIMM Installation

Step 1: **Locate the SO-DIMM socket**. Place the IEM-9452 on an anti-static pad.

Step 2: **Align the SO-DIMM with the socket**. The SO-DIMM must be oriented in such a

way that the notch in the middle of the SO-DIMM must be aligned with the plastic bridge in the socket.

Step 3: Insert the SO-DIMM. Push the SO-DIMM chip into the socket at an angle. (See **Figure 5-1**)

Step 4: **Open the SO-DIMM socket arms**. Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM down. (See **Figure 5-1**)

Step 5: **Secure the SO-DIMM**. Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM in the socket.

5.3.2 Mounting the IEM-9452 Embedded Module

The IEM-9452 embedded module has four standard ETX connectors on the reverse side. To install the IEM-9452 please refer to and follow the installation instructions below:

Step 1: **Align the ETX connectors**. Align the ETX connectors (ETX-X1, ETX-X2, ETX-X3 and ETX-X4) with the corresponding connectors on a compatible baseboard.

NOTE:

Baseboard can be designed by the end user, customized by IEI, or purchased from IEI. For more information visit the IEI webstie (www.ieiworld.com) or contact an IEI sales representative.

Step 2: **Gently insert the connectors**. Gently push the embedded module down to ensure the connectors are properly connected.

Step 3: **Align the heat sink.** Align the heat sink with the IEM-9452 making sure that the three onboard chipsets are in proper contact with the heat sink. Also make sure the retention screw holes on the corners of the heat sink are properly aligned

with the corresponding holes on the ETX module and baseboard.

Step 4: **Insert retention screws.** Insert four retention screws through the heat sink and IEM-9452 to secure them to the baseboard.

5.3.3 SATA Drive Connection

The IEM-9452 is shipped with two SATA drive cables and one SATA drive power cable. To connect the SATA drives to the connectors, please follow the steps below.

Step 5: **Locate the connectors**. The locations of the SATA drive connectors are shown in **Chapter 3**.

Step 6: **Insert the cable connector**. Press the clip on the connector at the end of the SATA cable and insert the cable connector into the on-board SATA drive connector. See **Figure 5-2**.

Step 7: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 5-2**.

Step 8: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-2**.

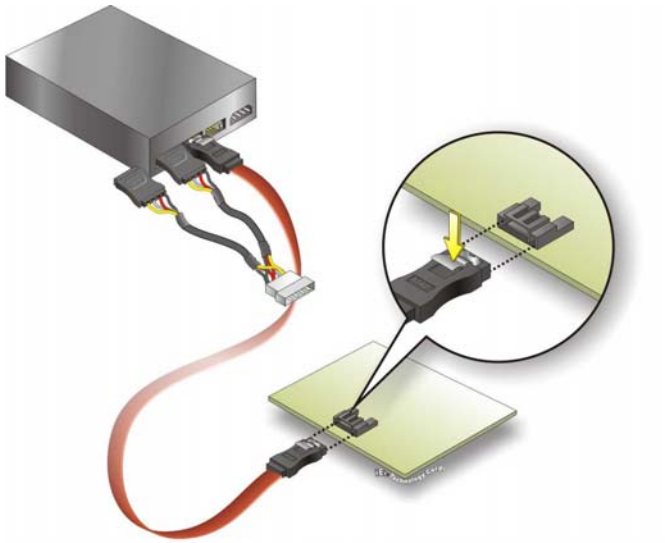


Figure 5-2: SATA Power Drive Connection

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Chapter

6

AMI BIOS

6.1 Introduction

A licensed copy of AMI BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

6.1.1 Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the **DELETE** key is pressed, restart the computer and try again.

6.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
Page Up key	Increase the numeric value or make changes
Page Dn key	Decrease the numeric value or make changes

Key	Function
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors. F2 to select color forward.
F10 key	Save all the CMOS changes, only for Main Menu

Table 6-1: BIOS Navigation Keys

6.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

6.1.4 BIOS Menu Bar

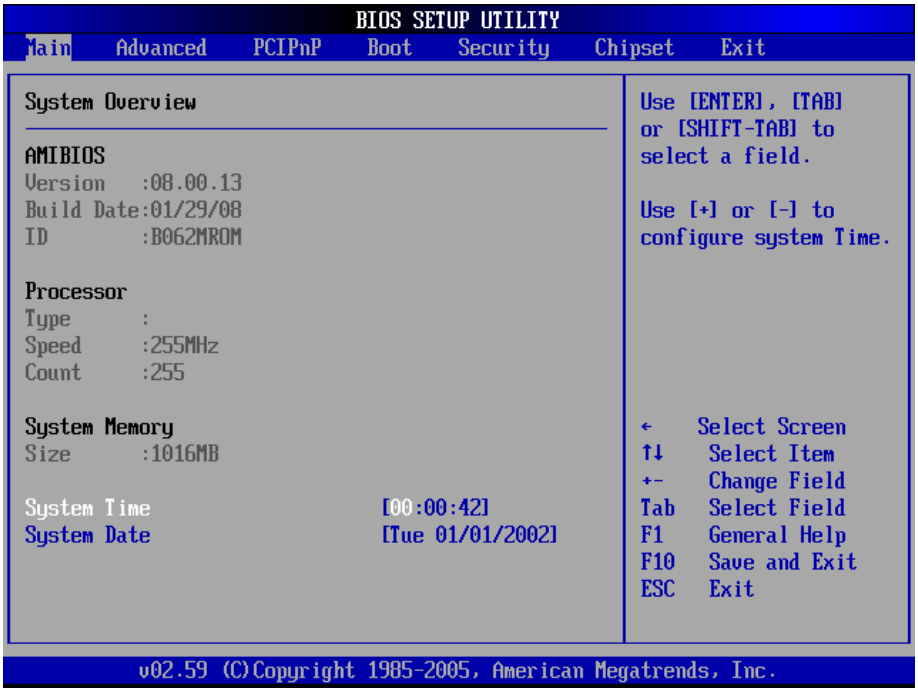
The **menu bar** on top of the BIOS screen has the following main items:

- **Main** Changes the basic system configuration.
- **Advanced** Changes the advanced system settings.
- **PCIPnP** Changes the advanced PCI/PnP Settings
- **Boot** Changes the system boot configuration.
- **Security** Sets User and Supervisor Passwords.
- **Chipset** Changes the chipset settings.
- **Power** Changes power management settings.
- **Exit** Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

6.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered. The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main

➔ **System Overview**

The **System Overview** lists a brief summary of different system components. The fields in **System Overview** cannot be changed. The items shown in the system overview include:

- **AMI BIOS**: Displays auto-detected BIOS information
  - **Version**: Current BIOS version
  - **Build Date**: Date the current BIOS version was made
  - **ID**: Installed BIOS ID
- **Processor**: Displays auto-detected CPU specifications
  - **Type**: Names the currently installed processor
  - **Speed**: Lists the processor speed
  - **Count**: The number of CPUs on the motherboard
- **System Memory**: Displays the auto-detected system memory.
  - **Size**: Lists memory size

The System Overview field also has two user configurable fields:

➔ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

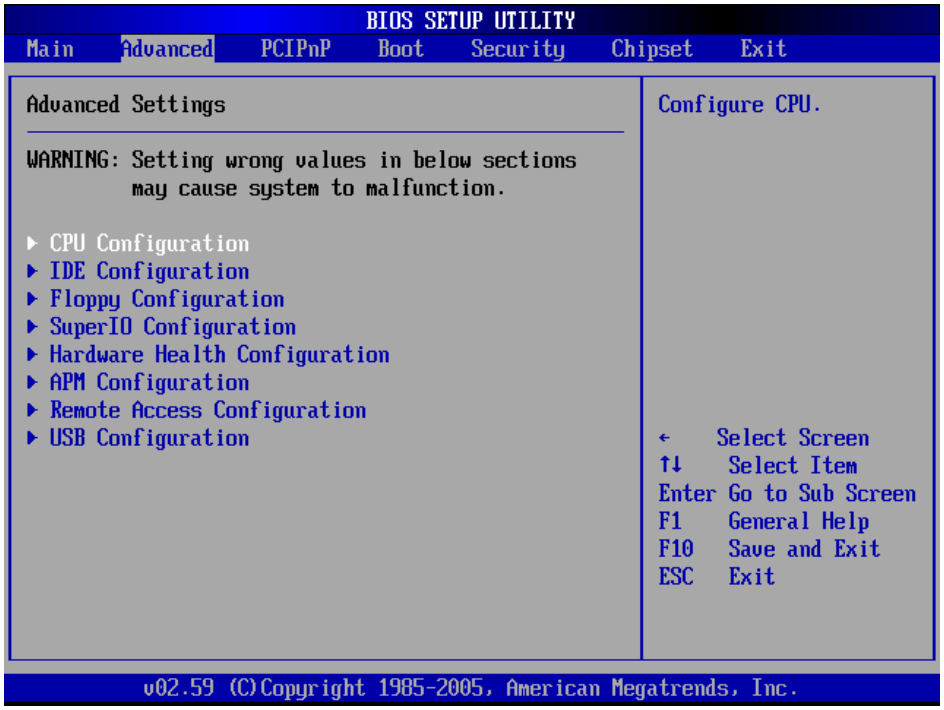
6.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING:

Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

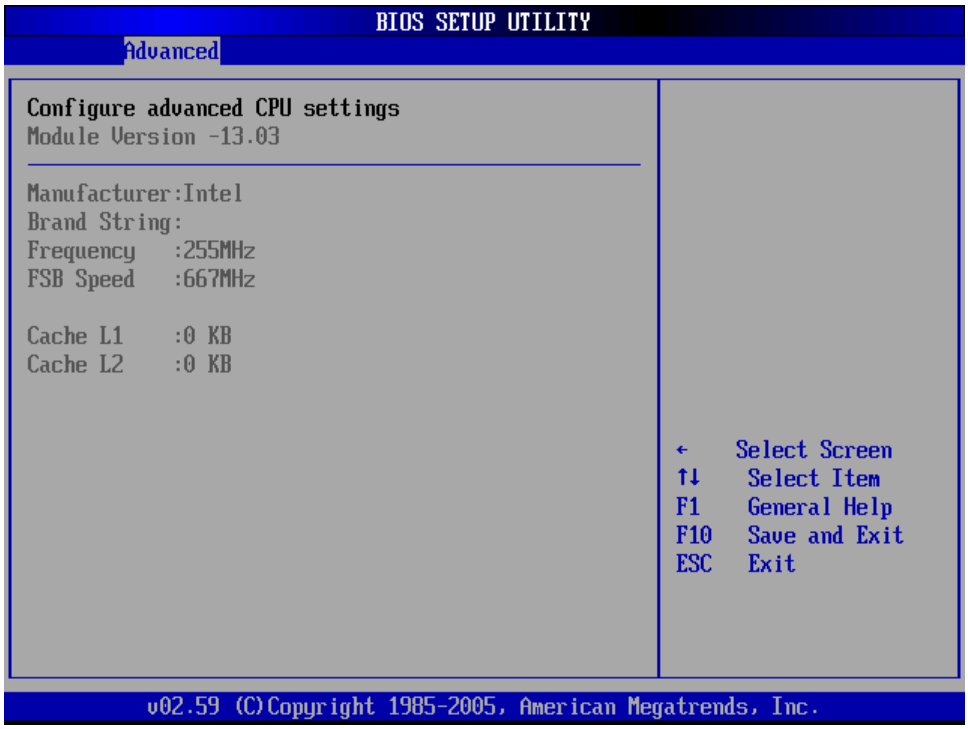
- CPU Configuration (see **Section 6.3.1**)
- IDE Configuration (see **Section 6.3.2**)
- Floppy Configuration (see **Section 6.3.3**)
- Super IO Configuration (see **Section 6.3.4**)
- Hardware Health Configuration (see **Section 6.3.5**)
- APM Configuration (see **Section 6.3.6**)
- Remote Access Configuration (see **Section 6.3.7**)
- USB Configuration (see **Section 6.3.8**)



BIOS Menu 2: Advanced

6.3.1 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 3**) to view detailed CPU specifications and configure the CPU.



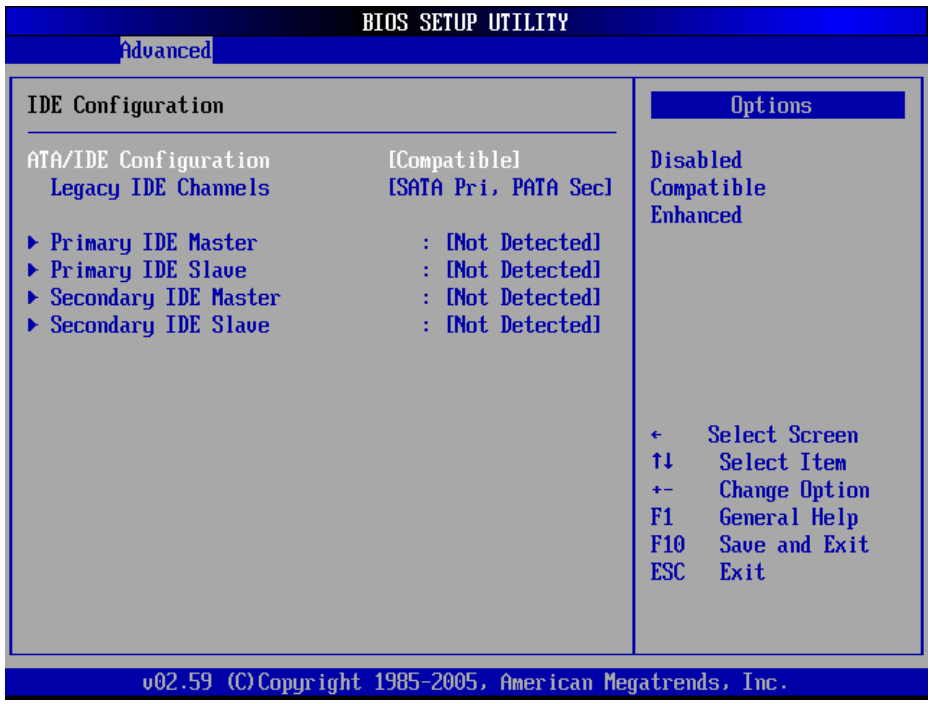
BIOS Menu 3: CPU Configuration

The **CPU Configuration** menu (**BIOS Menu 3**) lists the following CPU details:

- **Manufacturer**: Lists the name of the CPU manufacturer
- **Brand String**: Lists the brand name of the CPU being used
- **Frequency:** Lists the CPU processing speed
- **FSB Speed**: Lists the FSB speed
- **Cache L1**: Lists the CPU L1 cache size
- **Cache L2**: Lists the CPU L2 cache size

6.3.2 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 4**) to change and/or set the configuration of the IDE devices installed in the system.



BIOS Menu 4: IDE Configuration

➔ **ATA/IDE Configurations [Compatible]**

Use the **ATA/IDE Configurations** option to configure the ATA/IDE controller.

➔ **Disabled** Disables the on-board ATA/IDE controller.

➔ **Compatible** **DEFAULT** Configures the on-board ATA/IDE controller to be in compatible mode. In this mode, a SATA channel will replace one of the IDE channels. This mode supports up to 4 storage devices.

➔ **Enhanced** Configures the on-board ATA/IDE controller to be in Enhanced mode. In this mode, IDE channels and SATA channels are separated. This mode supports up to 6 storage devices. Some legacy OS do not support this mode.

➔ **Legacy IDE Channels [PATA Pri, SATA Sec]**

➔ **SATA Only**		Only the SATA drives are enabled.
➔ **PATA Pri, SATA Sec**	**DEFAULT**	The IDE drives are enabled on the Primary IDE channel. The SATA drives are enabled on the Secondary IDE channel.
➔ **PATA Pri., PATA Sec**		The IDE drives are enabled on the primary and secondary IDE channels. SATA drives are disabled.

➔ **Configure SATA as [IDE]**

Use the **Configure SATA as** option to configure SATA devices as normal IDE devices. (This option is available only when **ATA/IDE Configurations** option is set to Enhanced).

➔ **IDE**	**DEFAULT**	Configures SATA devices as normal IDE device.

➔ **Configure SATA Channels [Behind PATA]**

Use the **Configure SATA Channels** option to determine how SATA channels and PATA channels are ordered. (This option is available only when **ATA/IDE Configurations** option is set to Enhanced).

➔ **Before PATA**		Puts SATA channels before PATA channels.
➔ **Behind PATA**	**DEFAULT**	Puts SATA channels behind PATA channels.

➔ **IDE Master and IDE Slave**

When entering setup, BIOS auto detects the presence of IDE devices. BIOS displays the status of the auto detected IDE devices. The following IDE devices are detected and are shown in the **IDE Configuration** menu:

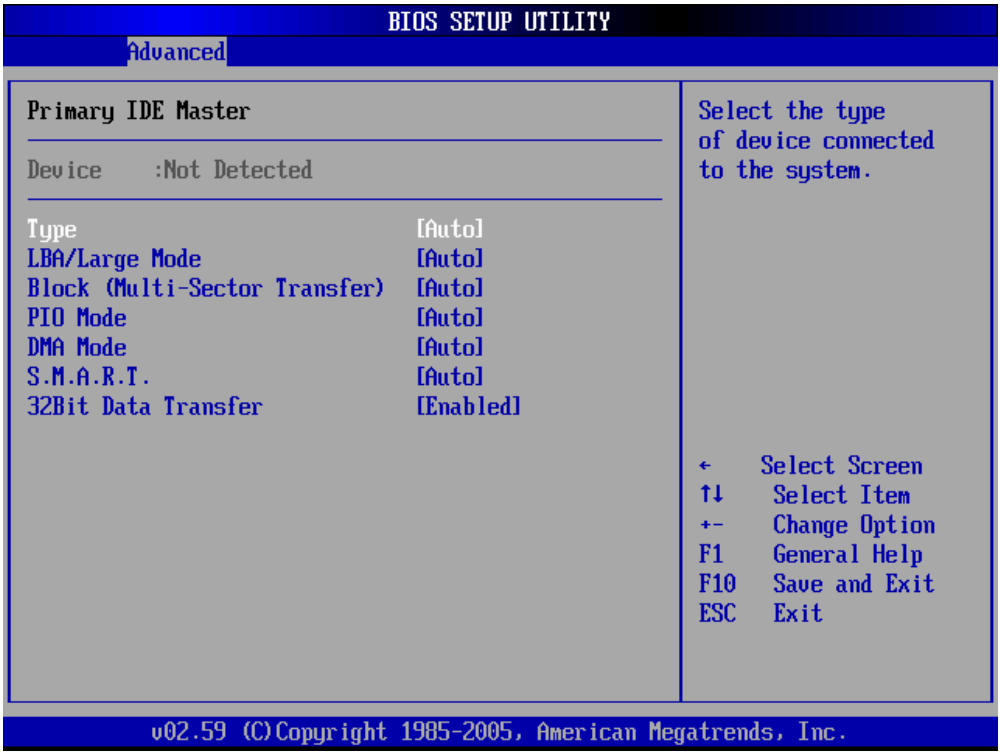
- Primary IDE Master
- Primary IDE Slave

- Secondary IDE Master
- Secondary IDE Slave

The **IDE Configuration** menu (**BIOS Menu 4**) allows changes to the configurations for the IDE devices installed in the system. If an IDE device is detected, and one of the above listed four BIOS configuration options are selected, the IDE configuration options shown in **Section 6.3.2.1** appear.

6.3.2.1 IDE Master, IDE Slave

Use the **IDE Master** and **IDE Slave** configuration menu to view both primary and secondary IDE device details and configure the IDE devices connected to the system.



BIOS Menu 5: IDE Master and IDE Slave Configuration

➔ **Auto-Detected Drive Parameters**

The “grayed-out” items in the left frame are IDE disk drive parameters automatically detected from the firmware of the selected IDE disk drive. The drive parameters are listed as follows:

- **Device**: Lists the device type (e.g. hard disk, CD-ROM etc.)
- **Type**: Indicates the type of devices a user can manually select
- **LBA Mode**: Indicates whether the LBA (Logical Block Addressing) is a method of addressing data on a disk drive is supported or not.
- **Block Mode**: Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.
- **PIO Mode**: Indicates the PIO mode of the installed device.
- **Async DMA**: Indicates the highest Asynchronous DMA Mode that is supported.
- **S.M.A.R.T.**: Indicates whether or not the Self-Monitoring Analysis and Reporting Technology protocol is supported.
- **32Bit Data Transfer**: Enables 32-bit data transfer.

➔ **Type [Auto]**

Use the **Type** BIOS option select the type of device the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) is complete.

➔ **Not Installed**		BIOS is prevented from searching for an IDE disk drive on the specified channel.
➔ **Auto**	**DEFAULT**	The BIOS auto detects the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel.
➔ **CD/DVD**		The CD/DVD option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The

BIOS does not attempt to search for other types of IDE disk drives on the specified channel.

➔ **ARMD** This option specifies an ATAPI Removable Media Device. These include, but are not limited to:

- ➔ **ZIP**
- ➔ **LS-120**

➔ LBA/Large Mode [Auto]

Use the **LBA/Large Mode** option to disable or enable BIOS to auto detects LBA (Logical Block Addressing). LBA is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB.

- ➔ **Disabled** BIOS is prevented from using the LBA mode control on the specified channel.
- ➔ **Auto** **DEFAULT** BIOS auto detects the LBA mode control on the specified channel.

➔ Block (Multi Sector Transfer) [Auto]

Use the **Block (Multi Sector Transfer)** to disable or enable BIOS to auto detect if the device supports multi-sector transfers.

- ➔ **Disabled** BIOS is prevented from using Multi-Sector Transfer on the specified channel. The data to and from the device occurs one sector at a time.
- ➔ **Auto** **DEFAULT** BIOS auto detects Multi-Sector Transfer support on the drive on the specified channel. If supported the data transfer to and from the device occurs multiple sectors at

a time.

➔ **PIO Mode [Auto]**

Use the **PIO Mode** option to select the IDE PIO (Programmable I/O) mode program timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

➔ **Auto**	**DEFAULT**	BIOS auto detects the PIO mode. Use this value if the IDE disk drive support cannot be determined.
➔ **0**		PIO mode 0 selected with a maximum transfer rate of 3.3MBps
➔ **1**		PIO mode 1 selected with a maximum transfer rate of 5.2MBps
➔ **2**		PIO mode 2 selected with a maximum transfer rate of 8.3MBps
➔ **3**		PIO mode 3 selected with a maximum transfer rate of 11.1MBps
➔ **4**		PIO mode 4 selected with a maximum transfer rate of 16.6MBps (This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.)

➔ **DMA Mode [Auto]**

Use the **DMA Mode** BIOS selection to adjust the DMA mode options.

➔ **Auto**	**DEFAULT**	BIOS auto detects the DMA mode. Use this value if the IDE disk drive support cannot be determined.
➔ **SWDMA0**		Single Word DMA mode 0 selected with a maximum data transfer rate of 2.1MBps
➔ **SWDMA1**		Single Word DMA mode 1 selected with a maximum data transfer rate of 4.2MBps

- **SWDMA2** Single Word DMA mode 2 selected with a maximum data transfer rate of 8.3MBps
- **MWDMA0** Multi Word DMA mode 0 selected with a maximum data transfer rate of 4.2MBps
- **MWDMA1** Multi Word DMA mode 1 selected with a maximum data transfer rate of 13.3MBps
- **MWDMA2** Multi Word DMA mode 2 selected with a maximum data transfer rate of 16.6MBps
- **UDMA0** Ultra DMA mode 0 selected with a maximum data transfer rate of 16.6MBps
- **UDMA1** Ultra DMA mode 1 selected with a maximum data transfer rate of 25MBps
- **UDMA2** Ultra DMA mode 2 selected with a maximum data transfer rate of 33.3MBps
- **UDMA3** Ultra DMA mode 3 selected with a maximum data transfer rate of 44MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA4** Ultra DMA mode 4 selected with a maximum data transfer rate of 66.6MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA5** Ultra DMA mode 5 selected with a maximum data transfer rate of 99.9MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)

➔ **S.M.A.R.T [Auto]**

Use the **S.M.A.R.T** option to auto-detect, disable or enable Self-Monitoring Analysis and Reporting Technology (SMART) on the drive on the specified channel. **S.M.A.R.T** predicts impending drive failures. The **S.M.A.R.T** BIOS option enables or disables this function.

➔ **Auto**	**DEFAULT**	BIOS auto detects HDD SMART support.
➔ **Disabled**		Prevents BIOS from using the HDD SMART feature.
➔ **Enabled**		Allows BIOS to use the HDD SMART feature

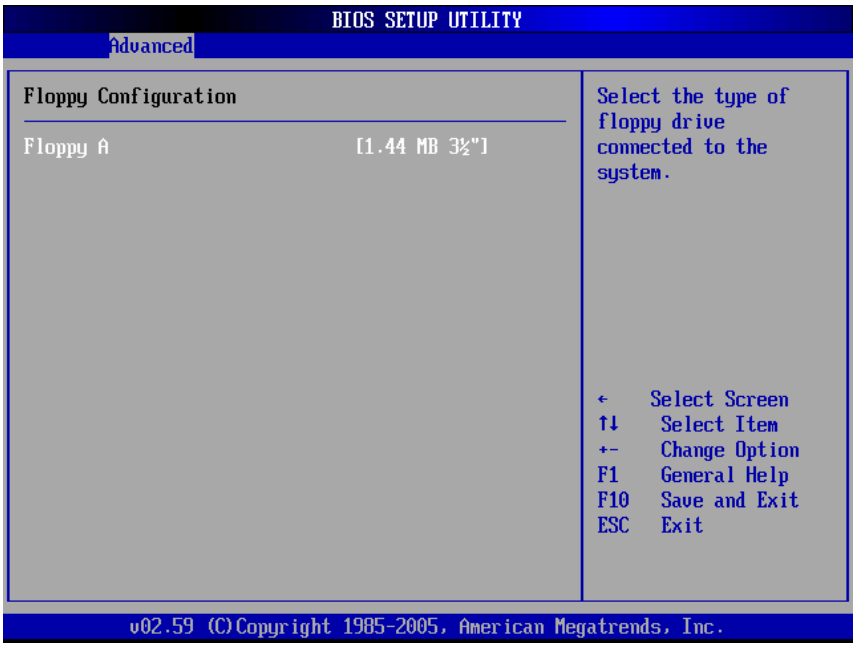
➔ **32Bit Data Transfer [Enabled]**

Use the **32Bit Data Transfer** BIOS option to enables or disable 32-bit data transfers.

➔ **Disabled**		Prevents the BIOS from using 32-bit data transfers.
➔ **Enabled**	**DEFAULT**	Allows BIOS to use 32-bit data transfers on supported hard disk drives.

6.3.3 Floppy Configuration

Use the **Floppy Configuration menu** (**BIOS Menu 6**) to configure the floppy disk drive connected to the system.



BIOS Menu 6: Floppy Configuration

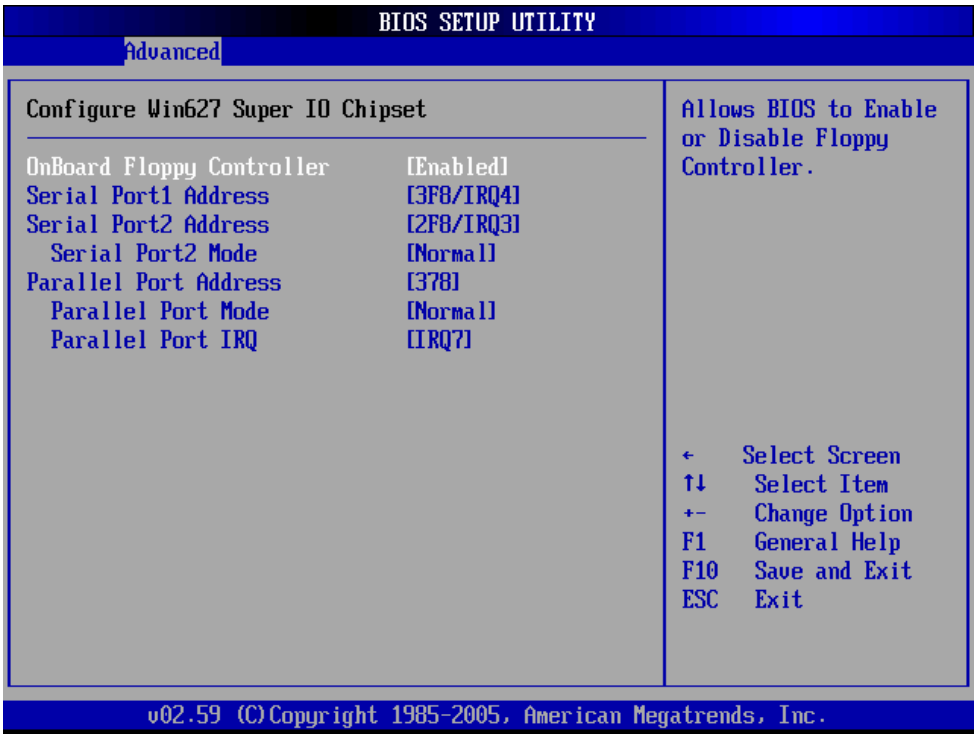
➔ **Floppy A/B [1.44 MB 31/2"]/[Disabled**

Use the **Floppy A/B** option to configure the floppy disk drive. Options are listed below:

- Disabled
- 360 KB 51/4"
- 1.2 MB 51/4"
- 720 KB 31/2"
- 1.44 MB 31/2' **DEFAULT**
- 2.88 MB 31/2"

6.3.4 Super IO Configuration

Use the **Super IO Configuration** menu (**BIOS Menu 7**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.



BIOS Menu 7: Super IO Configuration

➔ **OnBoard Floppy Controller [Enabled]**

Use the **OnBoard Floppy Controller** to enable or disable the floppy controller. If a floppy disk is not being used in the system, disabling this option frees up system resources that can be redirected elsewhere in the system.

➔ **Disabled** Allows BIOS to disable the floppy controller

➔ **Enabled** **DEFAULT** Allows BIOS to enable the floppy controller

➔ **Serial Port1 Address [3F8/IRQ4]**

Use the **Serial Port1 Address** option to select the Serial Port 1 base address.

➔ **Disabled** No base address is assigned to Serial Port 1

➔ **3F8/IRQ4** **DEFAULT** Serial Port 1 I/O port address is 3F8 and the interrupt

address is IRQ4

- **3E8/IRQ4** Serial Port 1 I/O port address is 3E8 and the interrupt address is IRQ4
- **2E8/IRQ3** Serial Port 1 I/O port address is 2E8 and the interrupt address is IRQ3

Serial Port2 Address [2F8/IRQ3]

Use the **Serial Port2 Address** option to select the Serial Port 2 base address.

- **Disabled** No base address is assigned to Serial Port 2
- **2F8/IRQ3** **DEFAULT** Serial Port 2 I/O port address is 3F8 and the interrupt address is IRQ3
- **3E8/IRQ4** Serial Port 2 I/O port address is 3E8 and the interrupt address is IRQ4
- **2E8/IRQ3** Serial Port 2 I/O port address is 2E8 and the interrupt address is IRQ3

Serial Port2 Mode [Normal]

Use the **Serial Port2 Mode** option to select the Serial Port2 operational mode.

- **Normal** **DEFAULT** Serial Port 2 mode is normal
- **IrDA** Serial Port 2 mode is IrDA
- **ASK IR** Serial Port 2 mode is ASK IR

Parallel Port Address [378]

Use the **Parallel Port Address** option to select the parallel port base address.

- **Disabled** No base address is assigned to the Parallel Port

- ➔ **378** **DEFAULT** Parallel Port I/O port address is 378
- ➔ **278** Parallel Port I/O port address is 278
- ➔ **3BC** Parallel Port I/O port address is 3BC

➔ **Parallel Port Mode [Normal]**

Use the **Parallel Port Mode** option to select the mode the parallel port operates in.

- ➔ **Normal** **DEFAULT** The normal parallel port mode is the standard mode for parallel port operation.
- ➔ **EPP** The parallel port operates in the enhanced parallel port mode (EPP). The EPP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode.
- ➔ **ECP** The parallel port operates in the extended capabilities port (ECP) mode. The ECP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode
- ➔ **ECP+EPP** The parallel port is also be compatible with EPP and ECP `devices described above

➔ **Parallel Port IRQ [IRQ7]**

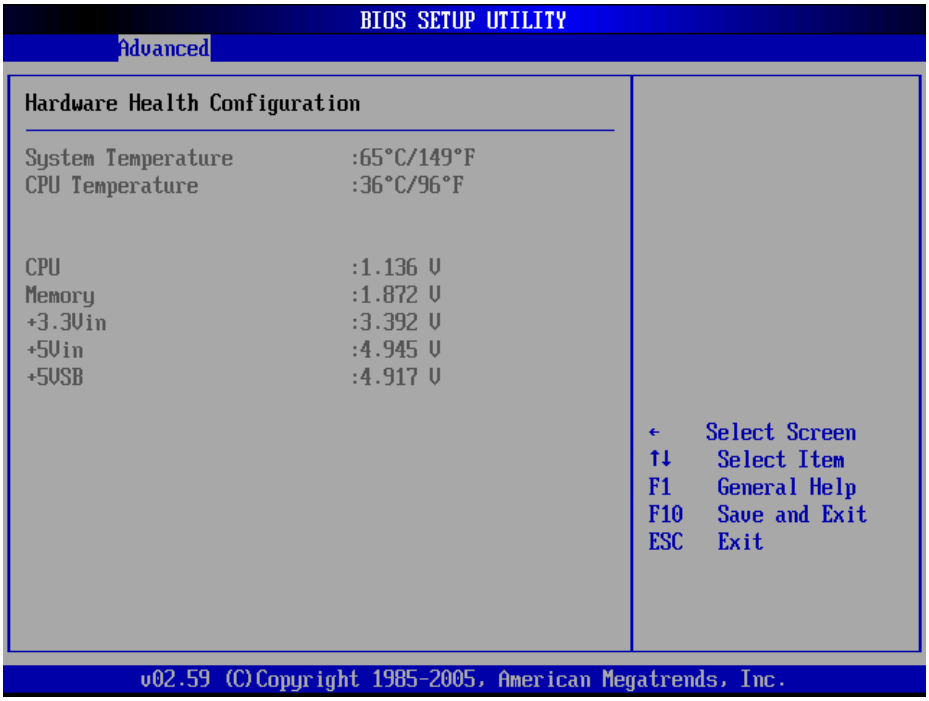
Use the **Parallel Port IRQ** option to set the parallel port interrupt address.

- ➔ **IRQ5** IRQ5 is assigned as the parallel port interrupt address

➔ **IRQ7** **DEFAULT** IRQ7 is assigned as the parallel port interrupt address

6.3.5 Hardware Health Configuration

The **Hardware Health Configuration** menu (**BIOS Menu 8**) shows the operating temperature, fan speeds and system voltages.



BIOS Menu 8: Hardware Health Configuration

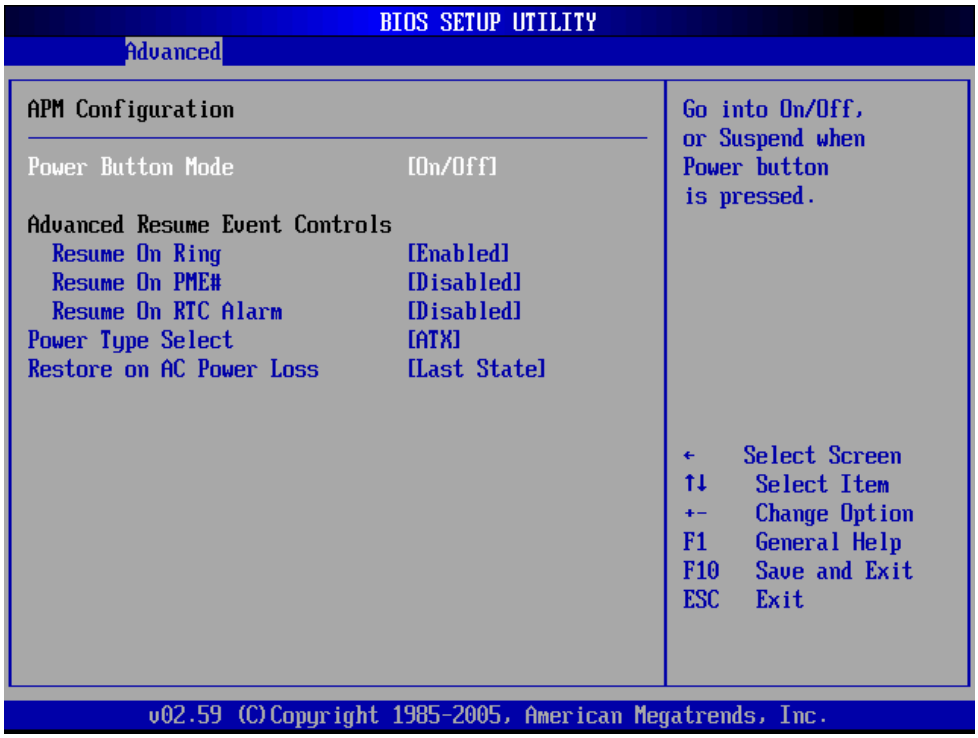
The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures: The following system temperatures are monitored
  - System Temperature
  - CPU Temperature
- Voltages: The following system voltages are monitored
  - CPU
  - Memory
  - +3.30Vin
  - +5.00Vin

- +5VSB

6.3.6 APM Configuration

The **APM Configuration** menu (**BIOS Menu 9**) allows the advanced power management options to be configured.


BIOS SETUP UTILITY
Advanced
APM Configuration
Power Button Mode [On/Off]
Advanced Resume Event Controls
Resume On Ring [Enabled]
Resume On PME# [Disabled]
Resume On RTC Alarm [Disabled]
Power Type Select [ATX]
Restore on AC Power Loss [Last State]
Go into On/Off, or Suspend when Power button is pressed.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 9: Advanced Power Management Configuration

➔ **Power Button Mode [On/Off]**

Use the **Power Button Mode** BIOS to specify how the power button functions.

➔ **On/Off** **DEFAULT** When the power button is pressed the system is either turned on or off

➔ **Suspend** When the power button is pressed the system goes into suspend mode

➔ **Resume on Ring [Enabled]**

Use the **Resume on Ring** BIOS option to enable activity on the RI (ring in) modem line to rouse the system from a suspend or standby state. That is, the system will be roused by an incoming call on a modem.

➔ **Disabled**		Wake event not generated by an incoming call
➔ **Enabled**	**DEFAULT**	Wake event generated by an incoming call

➔ **Resume on PME# [Disabled]**

Use the **Resume on PME#** BIOS option to enable activity on the PCI PME (power management event) controller to rouse the system from a suspend or standby state.

➔ **Disabled**	**DEFAULT**	Wake event not generated by PCI PME controller activity
➔ **Enabled**		Wake event generated by PCI PME controller activity

➔ **Resume On RTC Alarm [Disabled]**

Use the **Resume On RTC Alarm** option to specify the time the system should be roused from a suspended state.

➔ **Disabled**	**DEFAULT**	The real time clock (RTC) cannot generate a wake event
➔ **Enabled**		If selected, the following appears with values that can be selected: ➔ **RTC Alarm Date (Days)** ➔ **System Time** After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

➔ **Power Type Select [ATX]**

Use the **Power Type Select** BIOS option to select the power supply that is connected to the system.

➔ **AT**		An AT power supply is connected to the system
➔ **ATX**	**DEFAULT**	An ATX power supply is connected to the system

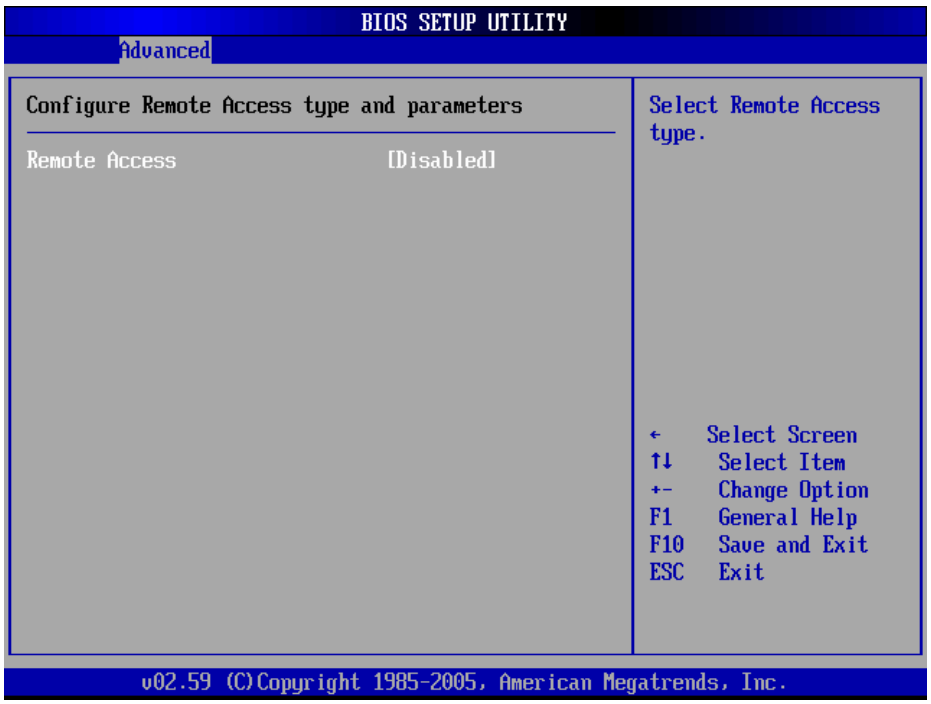
➔ **Restore on AC Power Loss [Last State]**

Use the **Restore on AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

➔ **Power Off**		The system remains turned off
➔ **Power On**		The system turns on
➔ **Last State**	**DEFAULT**	The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

6.3.7 Remote Access Configuration

Use the **Remote Access Configuration** menu (**BIOS Menu 10**) to configure remote access parameters. The **Remote Access Configuration** is an AMIBIOS feature and allows a remote host running a terminal program to display and configure the BIOS settings.



BIOS Menu 10: Remote Access Configuration [Advanced]

➔ **Remote Access [Disabled]**

Use the **Remote Access** option to enable or disable access to the remote functionalities of the system.

➔ **Disabled** **DEFAULT** Remote access is disabled.

➔ **Enabled** Remote access configuration options shown below appear:

- ➔ **Serial Port Number**
- ➔ **Serial Port Mode**
- ➔ **Flow Control**
- ➔ **Redirection after BIOS POST**
- ➔ **Terminal Type**

➔ **VT-UTF8 Combo Key Support**

➔ **Sredir Memory Display Delay**

These configuration options are discussed below.

➔ **Serial Port Number [COM1]**

Use the **Serial Port Number** option allows to select the serial port used for remote access.

➔ **COM1** **DEFAULT** System is remotely accessed through COM1

➔ **COM2** System is remotely accessed through COM2

NOTE: Make sure the selected COM port is enabled through the Super I/O configuration menu.

➔ **Base Address, IRQ [3F8h, 4]**

The **Base Address, IRQ** option cannot be configured and only shows the interrupt address of the serial port listed above.

➔ **Serial Port Mode [115200 8,n,1]**

Use the **Serial Port Mode** option to select baud rate through which the console redirection is made. The following configuration options are available

- 115200 8,n,1 DEFAULT
- 57600 8,n,1
- 38400 8,n,1
- 19200 8,n,1
- 09600 8,n,1

NOTE:

Identical baud rate setting musts be set on the host (a management computer running a terminal software) and the slave

➔ **Flow Control [None]**

Use the **Flow Control** option to report the flow control method for the console redirection application.

➔ **None**	**DEFAULT**	No control flow,
➔ **Hardware**		Hardware is set as the console redirection
➔ **Software**		Software is set as the console redirection

➔ **Redirection After BIOS POST [Always]**

Use the **Redirection After BIOS POST** option to specify when console redirection should occur.

➔ **Disabled**		The console is not redirected after POST
➔ **Boot Loader**		Redirection is active during POST and during Boot Loader
➔ **Always**	**DEFAULT**	Redirection is always active (Some OSes may not work if set to Always)

➔ **Terminal Type [ANSI]**

Use the **Terminal Type** BIOS option to specify the remote terminal type.

➔ **ANSI**	**DEFAULT**	The target terminal type is ANSI
➔ **VT100**		The target terminal type is VT100
➔ **VT-UTF8**		The target terminal type is VT-UTF8

➔ **VT-UTF8 Combo Key Support [Enabled]**

Use the **VT-UFT8 Combo Key Support** option to enable additional keys that are not provided by VT100 for the PC 101 keyboard.

The VT100 Terminal Definition is the standard convention used to configure and conduct emergency management tasks with UNIX-based servers. VT100 does not support all keys on the standard PC 101-key layout, however. The VT-UTF8 convention makes available additional keys that are not provided by VT100 for the PC 101 keyboard.

➔ **Disabled** Disables the VT-UTF8 terminal keys

➔ **Enabled** **DEFAULT** Enables the VT-UTF8 combination key. Support for ANSI/VT100 terminals

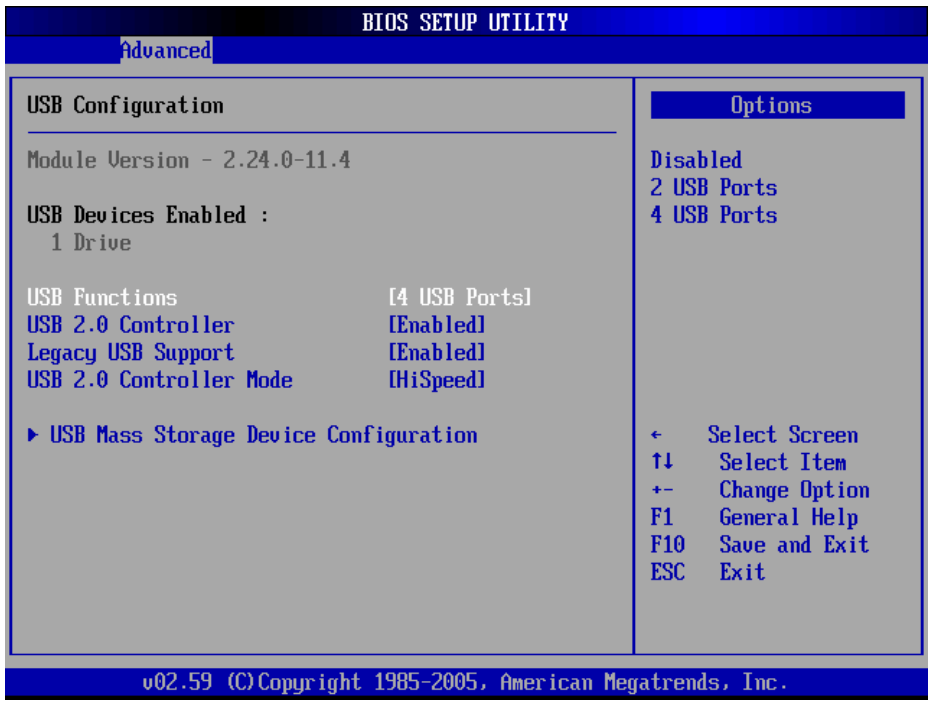
➔ **Sredir Memory Display Delay [No Delay]**

Use the **Sredir Memory Display Delay** option to select the delay before memory information is displayed. Configuration options are listed below

- No Delay **DEFAULT**
- Delay 1 sec
- Delay 2 sec
- Delay 4 sec

6.3.8 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 11**) to read USB configuration information and configure the USB settings.



BIOS Menu 11: USB Configuration

➔ **USB Functions [4 USB Ports]**

Use the **USB Functions** BIOS option to specify how many of the USB ports are USB 1.1 compatible.

➔ **Disabled**		None of the ports are USB 1.1 compatible
➔ **USB 2 Ports**		Two ports are USB 1.1 compatible
➔ **USB 4 ports**	**DEFAULT**	Four ports are USB 1.1 compatible

➔ **USB 2.0 Controller [Enabled]**

Use the **USB 2.0 Controller** BIOS option to enable or disable the USB 2.0 controller

➔ **Disabled**		USB 2.0 controller disabled
➔ **Enabled**	**DEFAULT**	USB 2.0 controller enabled

➔ **Legacy USB Support [Enabled]**

The **Legacy USB Support** BIOS option refers to USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded on the system.

➔ **Disabled**		Legacy USB support disabled
➔ **Enabled**	**DEFAULT**	Legacy USB support enabled

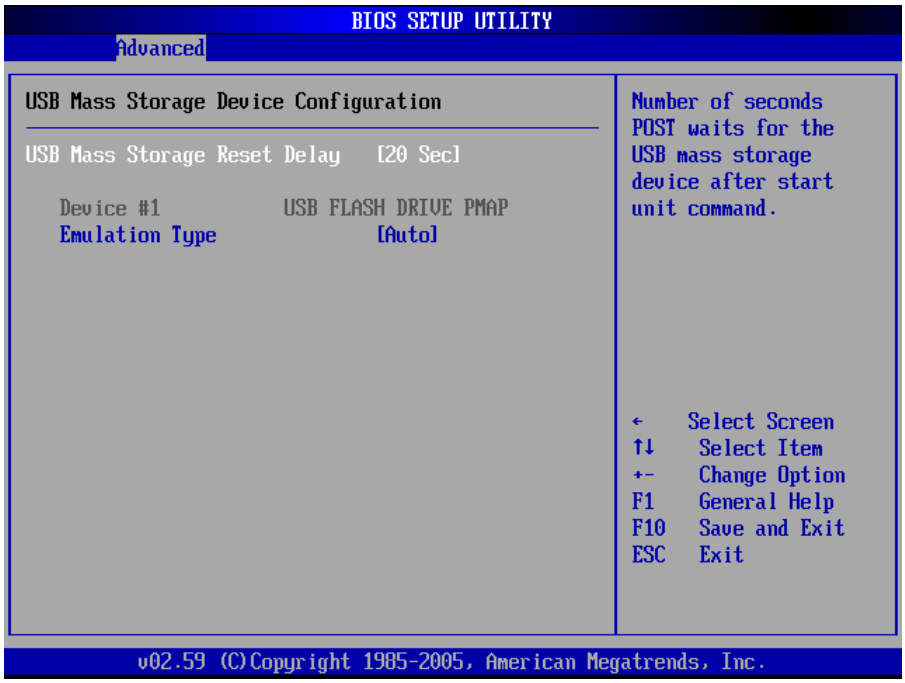
➔ **USB2.0 Controller Mode [HiSpeed]**

Use the **USB2.0 Controller Mode** option to set the speed of the USB2.0 controller.

➔ **FullSpeed**		The controller is capable of operating at 12Mb/s
➔ **HiSpeed**	**DEFAULT**	The controller is capable of operating at 480Mb/s

6.3.8.1 USB Mass Storage Device Configuration

Use the **USB Mass Storage Device Configuration** menu (**BIOS Menu 12**) to configure USB mass storage class devices.


BIOS SETUP UTILITY
Advanced
USB Mass Storage Device Configuration
USB Mass Storage Reset Delay [20 Sec]
Device #1 USB FLASH DRIVE PMAP
Emulation Type [Auto]
Number of seconds POST waits for the USB mass storage device after start unit command.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 12: USB Mass Storage Device Configuration

➔ **USB Mass Storage Reset Delay [20 Sec]**

Use the **USB Mass Storage Reset Delay** option to set the number of seconds POST waits for the USB mass storage device after the start unit command.

➔ **10 Sec**		POST waits 10 seconds for the USB mass storage device after the start unit command.
➔ **20 Sec**	**DEFAULT**	POST waits 20 seconds for the USB mass storage device after the start unit command.
➔ **30 Sec**		POST waits 30 seconds for the USB mass storage device after the start unit command.
➔ **40 Sec**		POST waits 40 seconds for the USB mass storage device after the start unit command.

➔ **Device ##**

The **Device##** field lists the USB devices that are connected to the system.

➔ **Emulation Type [Auto]**

Use the **Emulation Type** BIOS option to specify the type of emulation BIOS has to provide for the USB device.

NOTE:

Please note that the device's formatted type and the emulation type provided by the BIOS must match for a device to boot properly. If both types do not match then device's behavior is undefined. To make sure both types match, format the device using BIOS INT13h calls after selecting the proper emulation option in BIOS setup. The FORMAT utility provided by Microsoft® MS-DOS®, Microsoft® Windows® 95, and Microsoft® Windows® 98 can be used for this purpose.

➔ **Auto**	**DEFAULT**	BIOS auto-detects the current USB.
➔ **Floppy**		The USB device will be emulated as a floppy drive. The device can be either A: or B: responding to INT13h calls that return DL = 0 or DL = 1 respectively.
➔ **Forced FDD**		Allows a hard disk image to be connected as a floppy image. This option works only for drives formatted with FAT12, FAT16 or FAT32.
➔ **Hard Disk**		Allows the USB device to be emulated as hard disk responding to INT13h calls that return DL values of 80h or above.

➔ **CDROM**

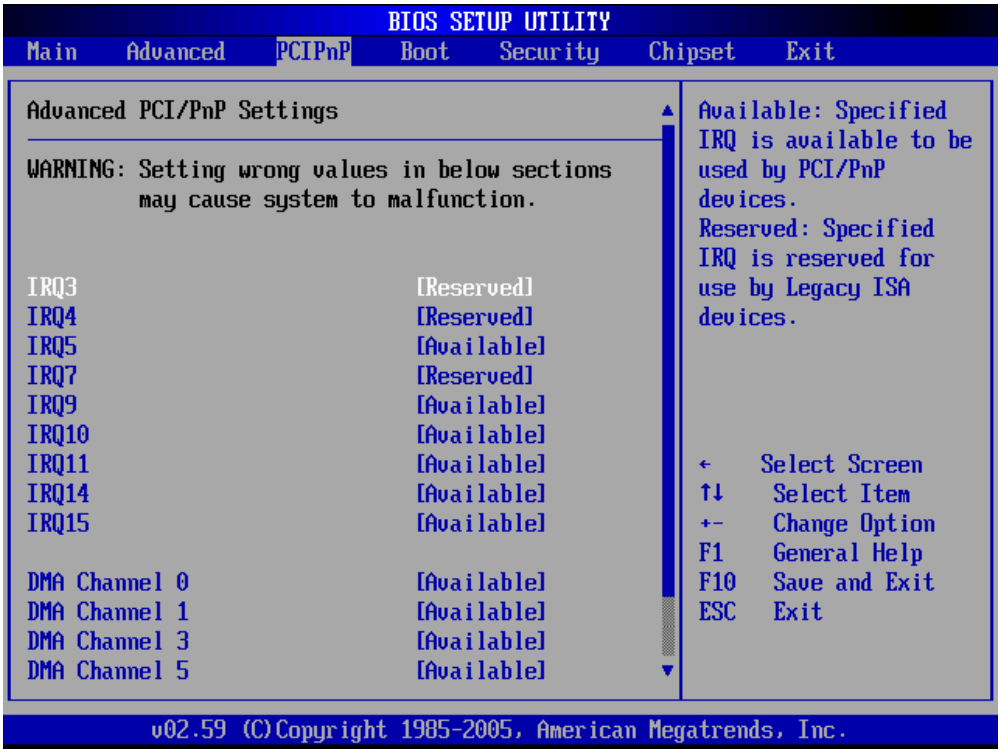
Assumes the CD-ROM is formatted as bootable media. All the devices that support block sizes greater than 512 bytes can only be booted using this option.

6.4 PCI/PnP

Use the **PCI/PnP** menu (**BIOS Menu 13**) to configure advanced PCI and PnP settings.

WARNING:

Setting wrong values for the BIOS selections in the PCIPnP BIOS menu may cause the system to malfunction.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Advanced PCI/PnP Settings
WARNING: Setting wrong values in below sections may cause system to malfunction.
IRQ3 [Reserved]
IRQ4 [Reserved]
IRQ5 [Available]
IRQ7 [Reserved]
IRQ9 [Available]
IRQ10 [Available]
IRQ11 [Available]
IRQ14 [Available]
IRQ15 [Available]
DMA Channel 0 [Available]
DMA Channel 1 [Available]
DMA Channel 3 [Available]
DMA Channel 5 [Available]
Available: Specified IRQ is available to be used by PCI/PnP devices.
Reserved: Specified IRQ is reserved for use by Legacy ISA devices.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 13: PCI/PnP Configuration

➔ **IRQ# [Available]**

Use the **IRQ#** address to specify what IRQs can be assigned to a particular peripheral device.

➔ **Available** **DEFAULT** The specified IRQ is available to be used by PCI/PnP devices

➔ **Reserved** The specified IRQ is reserved for use by Legacy ISA devices

Available IRQ addresses are:

- IRQ3
- IRQ4
- IRQ5
- IRQ7
- IRQ9
- IRQ10
- IRQ 11
- IRQ 14
- IRQ 15

➔ **DMA Channel# [Available]**

Use the **DMA Channel#** option to assign a specific DMA channel to a particular PCI/PnP device.

➔ **Available** **DEFAULT** The specified DMA is available to be used by PCI/PnP devices

➔ **Reserved** The specified DMA is reserved for use by Legacy ISA devices

Available DMA Channels are:

- DM Channel 0

- DM Channel 1
- DM Channel 3
- DM Channel 5
- DM Channel 6
- DM Channel 7

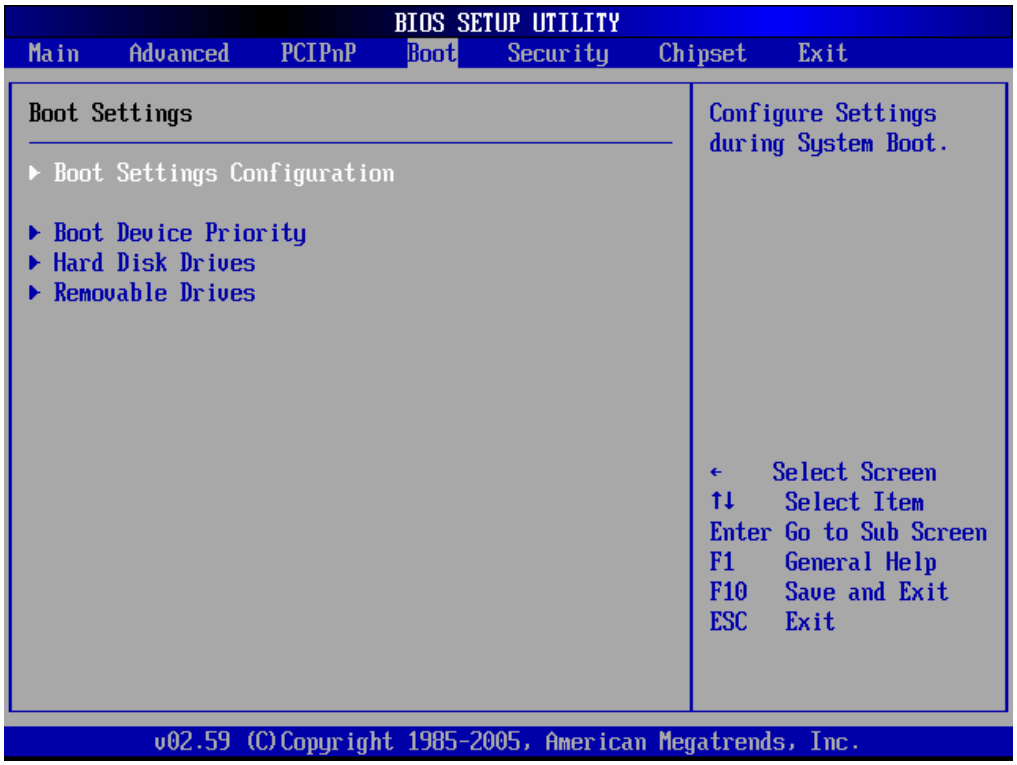
➔ **Reserved Memory Size [Disabled]**

Use the **Reserved Memory Size** BIOS option to specify the amount of memory that should be reserved for legacy ISA devices.

➔	**Disabled**	**DEFAULT**	No memory block reserved for legacy ISA devices
➔	**16K**		16KB reserved for legacy ISA devices
➔	**32K**		32KB reserved for legacy ISA devices
➔	**64K**		54KB reserved for legacy ISA devices

6.5 Boot

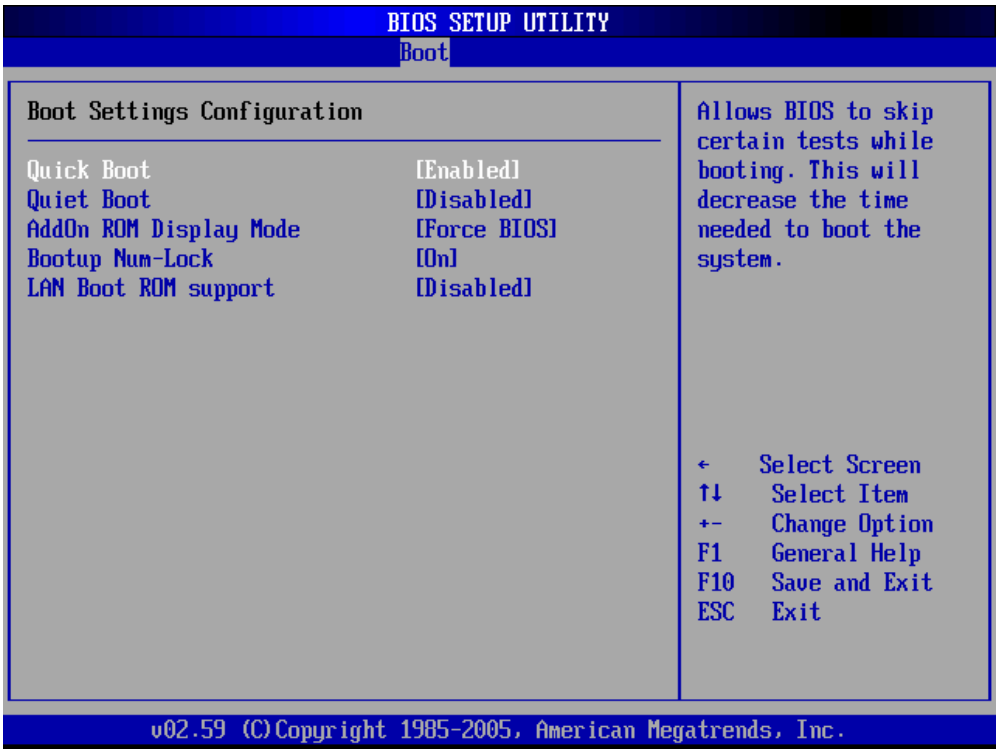
Use the **Boot** menu (**BIOS Menu 14**) to configure system boot options.



BIOS Menu 14: Boot

6.5.1 Boot Settings Configuration

Use the **Boot Settings Configuration** menu (**BIOS Menu 15**) to configure advanced system boot options.


BIOS SETUP UTILITY
Boot
Boot Settings Configuration
Quick Boot [Enabled]
Quiet Boot [Disabled]
AddOn ROM Display Mode [Force BIOS]
Bootup Num-Lock [On]
LAN Boot ROM support [Disabled]
Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 15: Boot Settings Configuration

➔ **Quick Boot [Enabled]**

Use the **Quick Boot** BIOS option to make the computer speed up the boot process.

➔ **Disabled**		No POST procedures are skipped
➔ **Enabled**	**DEFAULT**	Some POST procedures are skipped to decrease the system boot time

➔ **Quiet Boot [Disabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔ **Disabled**	**DEFAULT**	Normal POST messages displayed
➔ **Enabled**		OEM Logo displayed instead of POST messages

➔ **AddOn ROM Display Mode [Force BIOS]**

Use the **AddOn ROM Display Mode** option to allow add-on ROM (read-only memory) messages to be displayed.

➔ **Force BIOS**	**DEFAULT**	The system forces third party BIOS to display during system boot.
➔ **Keep Current**		The system displays normal information during system boot.

➔ **Bootup Num-Lock [On]**

Use the **Bootup Num-Lock** BIOS option to specify if the number lock setting must be modified during boot up.

➔ **Off**		Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.
➔ **On**	**DEFAULT**	Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **LAN Boot ROM Support [Enabled]**

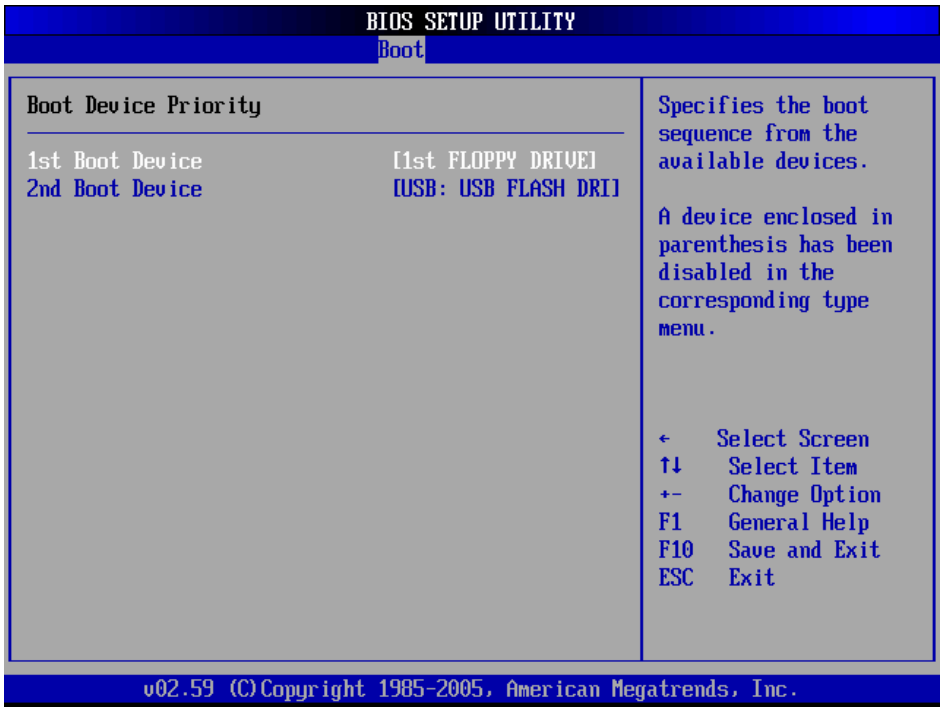
Use the **LAN Boot ROM Support** option to enable the system to be booted from the LAN.

➔ **Disabled**		System cannot be booted from the LAN
➔ **Enabled**	**DEFAULT**	System can be booted from the LAN

6.5.2 Boot Device Priority

Use the **Boot Device Priority** menu (**BIOS Menu 16**) to specify the boot sequence from the available devices. Possible boot devices may include:

- 1st FLOPPY DRIVE
- HDD
- CD/DVD


BIOS SETUP UTILITY
Boot
Boot Device Priority
1st Boot Device [1st FLOPPY DRIVE]
2nd Boot Device [USB: USB FLASH DRI]
Specifies the boot sequence from the available devices.
A device enclosed in parenthesis has been disabled in the corresponding type menu.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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BIOS Menu 16: Boot Device Priority Settings

6.5.3 Hard Disk Drives

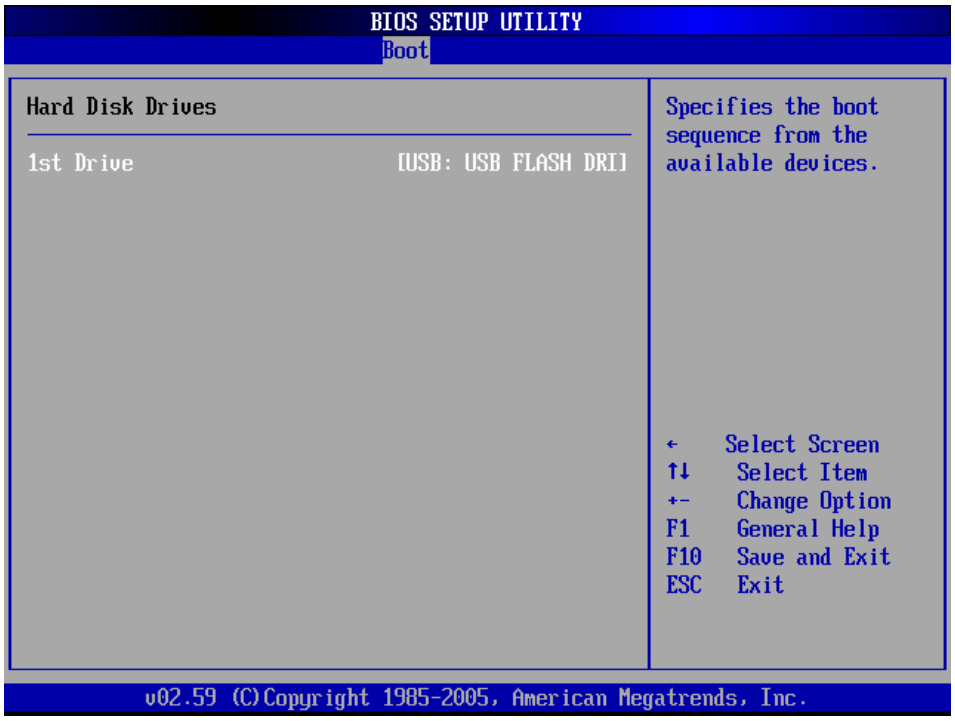
Use the **Hard Disk Drives** menu to specify the boot sequence of the available HDDs. When the menu is opened, the HDDs connected to the system are listed as shown below:

- 1st Drive [HDD: PM-(part number)]
- 2nd Drive [HDD: PS-(part number)]

NOTE:

Only the drives connected to the system are shown. For example, if only two HDDs are connected only "**1st Drive**" and "**2nd Drive**" are listed.

The boot sequence from the available devices is selected. If the "**1st Drive**" option is selected a list of available HDDs is shown. Select the first HDD the system boots from. If the "**1st Drive**" is not used for booting this option may be disabled.



BIOS Menu 17: Hard Disk Drives

6.5.4 Removable Drives

Use the **Removable Drives** menu (**BIOS Menu 18**) to specify the boot sequence of the available FDDs. When the menu is opened, the FDDs connected to the system are listed as shown below:

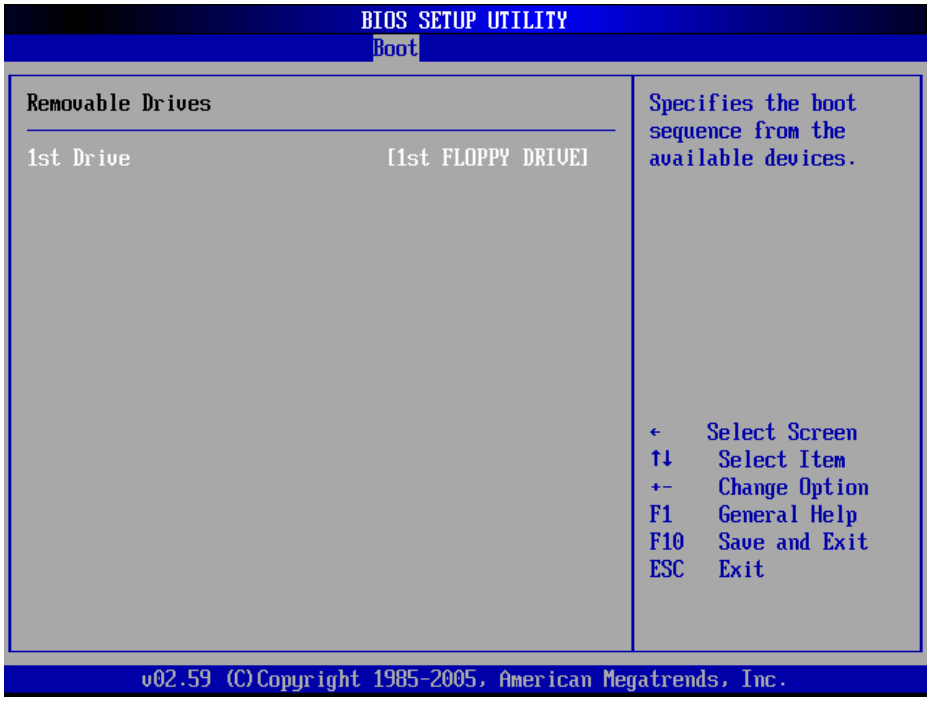
- 1st Drive [1st FLOPPY DRIVE]

- 2nd Drive [2nd FLOPPY DRIVE]

NOTE:

Only the drives connected to the system are shown. For example, if only one FDD is connected only "**1st Drive**" is listed.

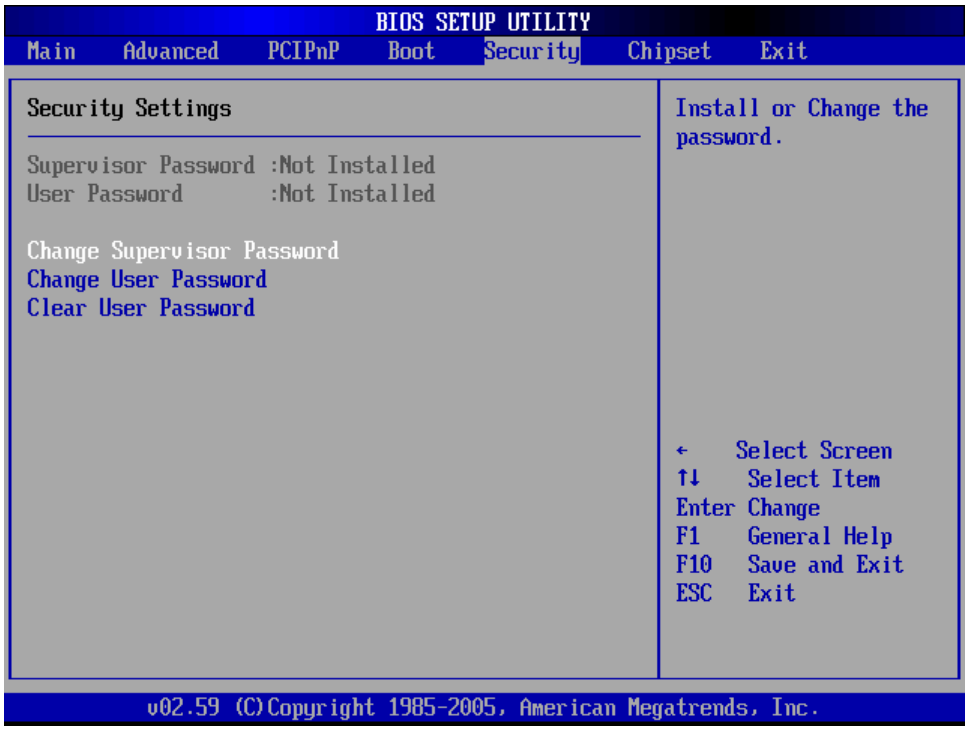
The boot sequence from the available devices is selected. If the "**1st Drive**" option is selected a list of available FDDs is shown. Select the first FDD the system boots from. If the "**1st Drive**" is not used for booting this option may be disabled.



BIOS Menu 18: Removable Drives

6.6 Security

Use the **Security** menu (**BIOS Menu 19**) to set system and user passwords.



BIOS Menu 19: Security

➔ **Change Supervisor Password**

Use the **Change Supervisor Password** to set or change a supervisor password. The default for this option is **Not Installed**. If a supervisor password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change Supervisor Password**.

➔ **Change User Password**

Use the **Change User Password** to set or change a user password. The default for this option is **Not Installed**. If a user password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change User Password**.

➔ **Clear User Password**

Use the **Clear User Password** to clear a user's password. The default for this option is **Not Installed**. If a user password must be cleared, use this option.

6.7 Chipset

Use the **Chipset** menu (**BIOS Menu 20**) to access the Northbridge and Southbridge configuration menus.

WARNING:

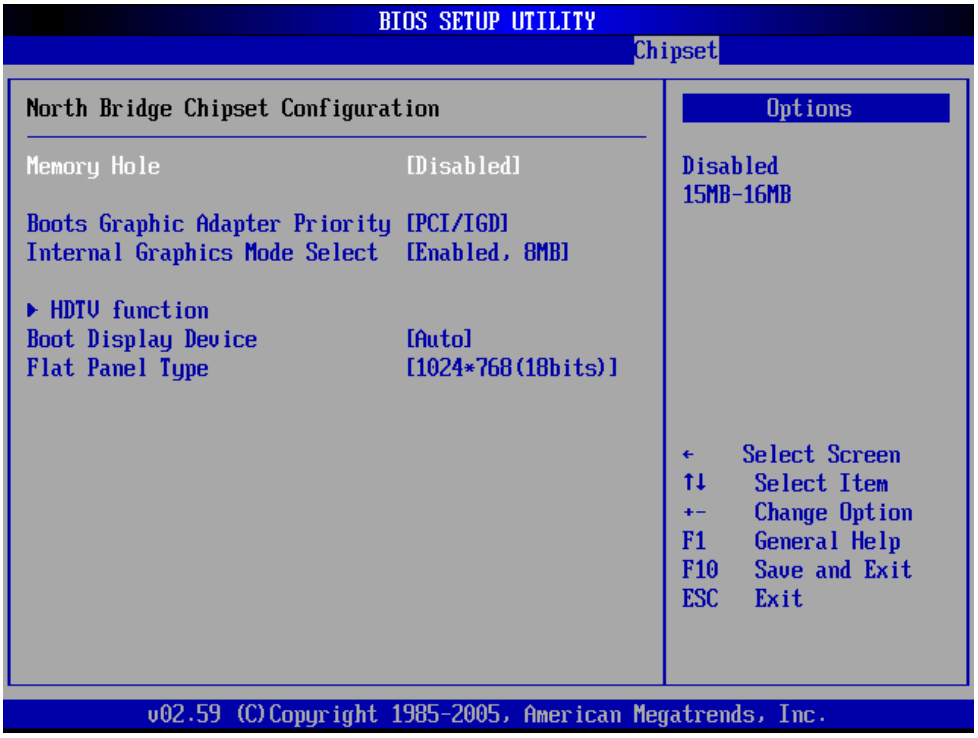
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Advanced Chipset Settings
WARNING: Setting wrong values in below sections may cause system to malfunction.
North Bridge Configuration
Configure North Bridge features.
← Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
v02.59 (C)Copyright 1985-2005, American Megatrends, Inc.

BIOS Menu 20: Chipset

6.7.1 NorthBridge Configuration

Use the **NorthBridge Configuration** menu (**BIOS Menu 21**) to configure the Northbridge chipset.



BIOS Menu 21:NorthBridge Chipset Configuration

➔ **Memory Hole [Disabled]**

Use the **Memory Hole** option to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

➔ **Disabled**	**DEFAULT**	Memory is not reserved for ISA expansion cards
➔ **15MB – 16MB**		Between 15MB and 16MB of memory is reserved for ISA expansion cards

➔ **Boots Graphic Adapter Priority [Internal VGA]**

Use the **Boots Graphic Adapter Priority** option to select the graphics controller used as the primary boot device. Select either an integrated graphics controller (IGD) or a combination of PCI graphics controller, a PCI express (PEG) controller or an IGD. Configuration options are listed below:

- IGD
- PEG/IGD
- PEG/PCI
- PCI/PEG
- PCI/IGD **DEFAULT**

➔ **Internal Graphics Mode Select [Enable, 8MB]**

The **Internal Graphic Mode Select** option determines the amount of system memory that can be used by the Internal graphics device.

➔ **Disable**		
➔ **Enable, 1MB**		1MB of memory used by internal graphics device
➔ **Enable, 4MB**		4MB of memory used by internal graphics device
➔ **Enable, 8MB**	**DEFAULT**	8MB of memory used by internal graphics device
➔ **Enable, 16MB**		16MB of memory used by internal graphics device
➔ **Enable, 32MB**		32MB of memory used by internal graphics device

➔ **Boot Display Device [Auto]**

The **Boot Display Device** BIOS option selects the display device the system uses when it boots. The available options are listed below:

- Auto **DEFAULT**
- CRT
- LFP
- CRT + LFP

➔ **Flat Panel Type [1024*768 (18bits)]**

The **Flat Panel Type** BIOS option specifies the flat panel PC type being used.

NOTE:

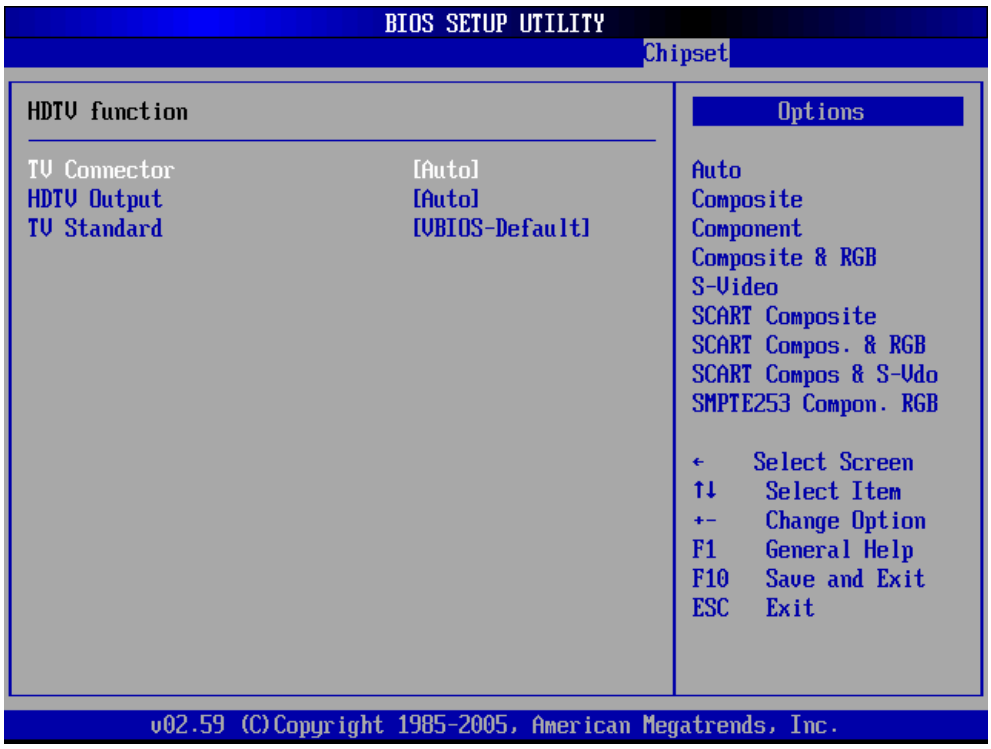
Please refer to the technical documents that came with the flat panel PC to ensure the correct settings are selected.

The following options are available:

- 640x480 18bit LVDS (Default)
- 800x600 18bit LVDS
- 1024x768 18bit LVDS
- 1280x1024 36bit LVDS
- 1400x1050 36bit LVDS
- 1600x1200 36bit LVDS
- 1440x900 36bit LVDS
- 1280x800 18bit LVDS
- 1280x600 18bit LVDS

6.7.1.1 HDTV Function

Use the **HDTV Function** menu (**BIOS Menu 22**) to configure the HDTV device connected to the system.



BIOS Menu 22:HDTV Function

➔ **TV Connector [Auto]**

Use the **TC Connector** option to select the connector that is used to connect the system to the television. The configuration options are listed below.

- Auto **Default**
- Composite
- Component
- Composite & RGB
- S-Video
- SCART Composite
- SCART Compos. & RGB
- SCART Compos. & S-Vdo
- SMPTE253 Component. RGB

➔ **HDTV Output [Auto]**

Use the **HDTV Output** option to select the number of vertical lines in each frame, the method the HDTV connected to the system scans and the frequency of the frames.

The two scanning types can be selected interlaced (i) or progressive (p). Interlaced scanning divides and presents each video frame as two fields. The first field presents the odd lines and the second field presents the even lines. In progressive scanning, the image is refreshed from top to bottom, one line after the other.

Configuration options are listed below:

Option	Scan Type	Vertical Lines	Frame Frequency
Auto	Auto	Auto	Auto
480i60	Interlaced	240 per field (480 per frame)	60 frames per second
480p60	Progressive	480 per frame	60 frames per second
576i50	Interlaced	283 per field (576 per frame)	50 frames per second
576p50	Progressive	576 per frame	50 frames per second
720p60	Progressive	720 per frame	60 frames per second
1080i50	Interlaced	540 per field (1080 per frame)	50 frames per second
1080i60	Interlaced	540 per field (1080 per frame)	60 frames per second
1080p24	Progressive	1080 per frame	24 frames per second

➔ **TV Standard [VBIOS-Default]**

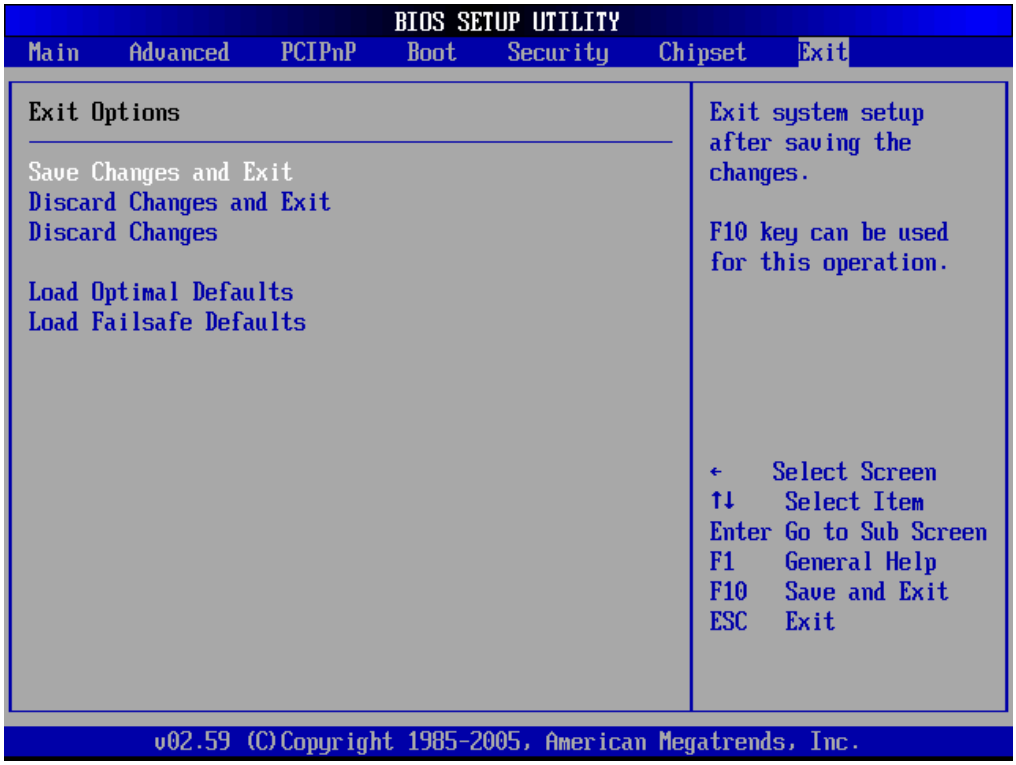
Use the **TV Standard** option to select the standard of the television connected to the system. The configuration options are listed below.

- VBIOS-Default **DEFAULT**
- NTSC
- PAL
- SECAM
- SMPTE295M
- ITU-R television
- SMPTE295M
- SMPTE296M

- ETA-770.2

6.8 Exit

Use the **Exit** menu (**BIOS Menu 23**) to load default BIOS values, optimal failsafe values and to save configuration changes.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Exit Options
Save Changes and Exit
Discard Changes and Exit
Discard Changes
Load Optimal Defaults
Load Failsafe Defaults
Exit system setup after saving the changes.
F10 key can be used for this operation.
← Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
v02.59 (C)Copyright 1985-2005, American Megatrends, Inc.

BIOS Menu 23:Exit

➔ **Save Changes and Exit**

Use the **Save Changes and Exit** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

➔ **Discard Changes and Exit**

Use the **Discard Changes and Exit** option to exit the BIOS configuration setup program without saving the changes made to the system.

➔ **Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in the BIOS configuration setup program.

➔ **Load Optimal Defaults**

Use the **Load Optimal Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F9 key can be used for this operation.**

➔ **Load Failsafe Defaults**

Use the Load Failsafe Defaults option to load failsafe default values for each of the parameters on the Setup menus. F8 key can be used for this operation.

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Chapter

7

Driver Installation

7.1 Available Software Drivers

NOTE:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

The following drivers can be installed on the system:

- Intel® Chipset driver
- VGA driver (Intel® Graphics Media Accelerator Driver)
- LAN driver (Intel Network Adapter)
- Audio driver (Realtek AC`97 Audio Driver (ALC665))

Installation instructions are given below.

7.2 Driver CD Auto-run

All the drivers for the IEM-9452 are on the CD that came with the system. To install the drivers, please follow the steps below.

Step 1: Insert the CD into a CD drive connected to the system.

NOTE:

If the system does not initiate the "autorun" program when the CD is inserted, click the **Start** button, select **Run**, then type **X:\autorun.exe** (where **X:** is the system CD drive) to access the IEI Driver CD main menu.

Step 2: The driver main menu appears (**Figure 7-1**).

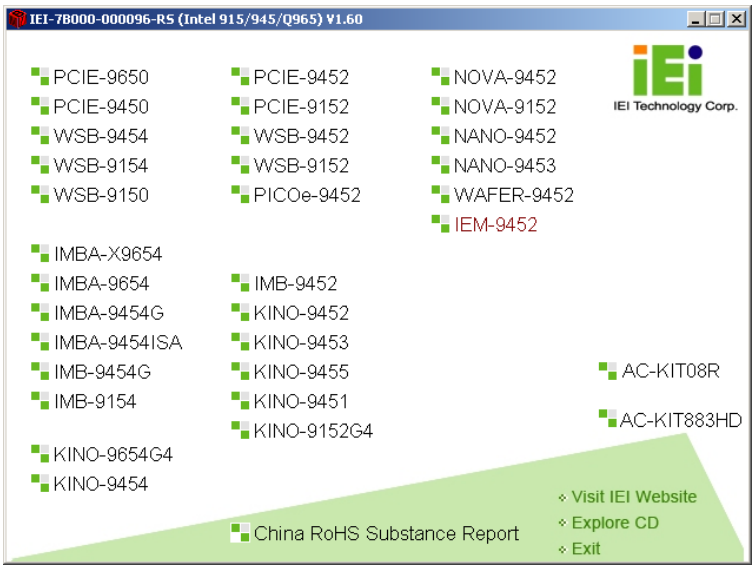


Figure 7-1: Introduction Screen

Step 3: Click IEM-9452.

Step 4: A new screen with a list of available drivers appears (**Figure 7-2**).

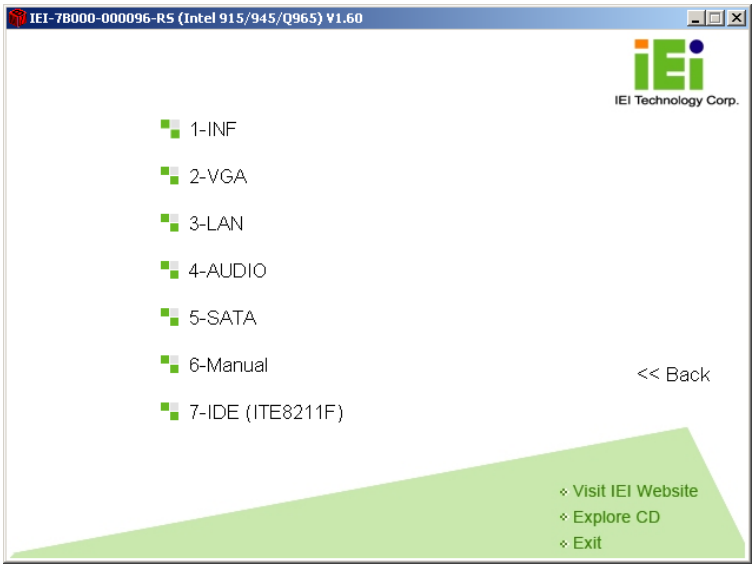


Figure 7-2: Available Drivers

Step 5: Select the driver to install from the list in **Figure 7-2**. Detailed driver installation instructions follow below.

7.3 Intel® Chipset Driver Installation

To install the chipset driver, please follow the steps below.

Step 6: Select **INF** from the list in **Figure 7-2**.

Step 7: A new window opens (**Figure 7-3**).

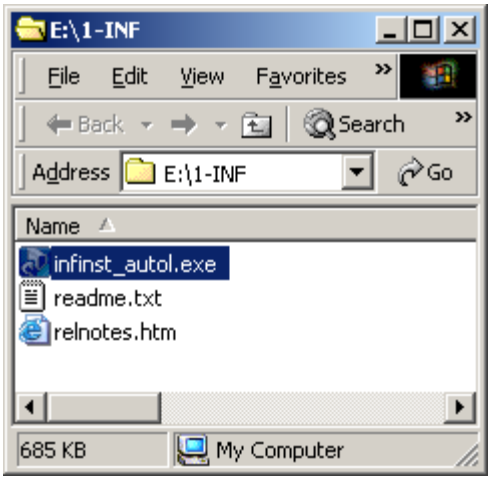


Figure 7-3: Chipset Driver Installation Program

Step 8: Double-click the **infinst_Autol.exe** icon.

Step 9: The welcome screen in **Figure 7-4** appears.

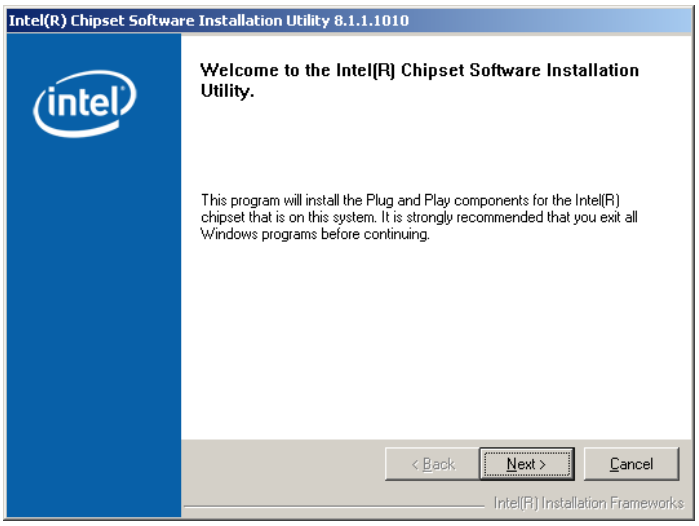

Intel(R) Chipset Software Installation Utility 8.1.1.1010
Welcome to the Intel(R) Chipset Software Installation Utility.
This program will install the Plug and Play components for the Intel(R) chipset that is on this system. It is strongly recommended that you exit all Windows programs before continuing.
< Back
Next >
Cancel
Intel(R) Installation Frameworks

Figure 7-4: Chipset Driver Installation Welcome Screen

Step 10: Click **NEXT** to continue the installation process.

Step 11: The license agreement in **Figure 7-5** appears.

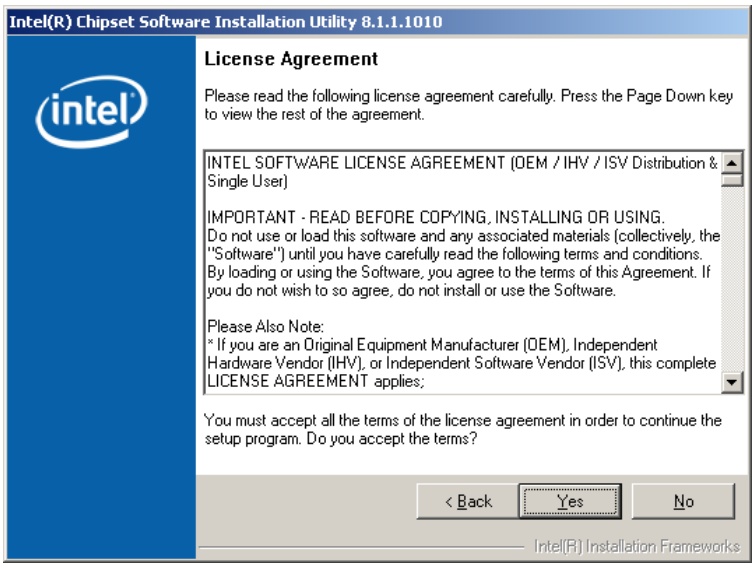

Intel(R) Chipset Software Installation Utility 8.1.1.1010
License Agreement
Please read the following license agreement carefully. Press the Page Down key to view the rest of the agreement.
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions.
By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
You must accept all the terms of the license agreement in order to continue the setup program. Do you accept the terms?
< Back
Yes
No
Intel(R) Installation Frameworks

Figure 7-5: Chipset Driver Installation License Agreement

Step 12: Read the license agreement. To accept the terms and conditions stipulated in the agreement, click **YES**.

Step 13: The Readme file in **Figure 7-6** appears.

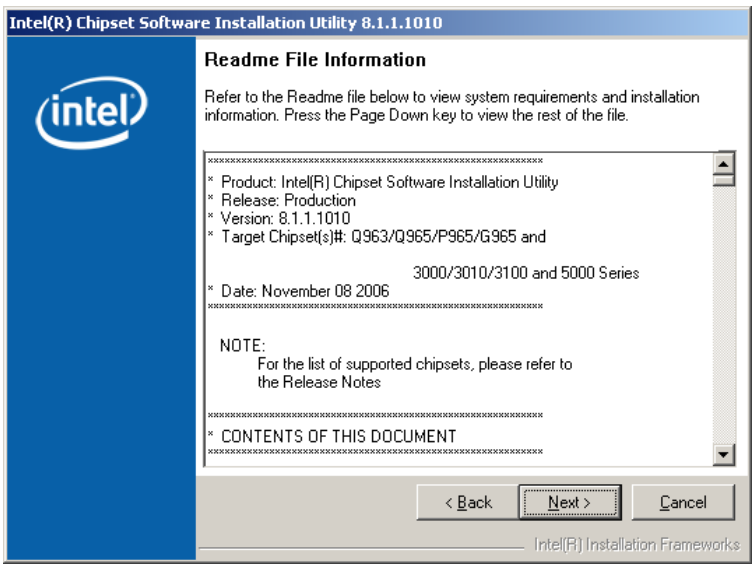

Intel(R) Chipset Software Installation Utility 8.1.1.1010
Readme File Information
Refer to the Readme file below to view system requirements and installation information. Press the Page Down key to view the rest of the file.
* Product: Intel(R) Chipset Software Installation Utility
* Release: Production
* Version: 8.1.1.1010
* Target Chipset(s)#: Q963/Q965/P965/G965 and
3000/3010/3100 and 5000 Series
* Date: November 08 2006
NOTE:
For the list of supported chipsets, please refer to the Release Notes
* CONTENTS OF THIS DOCUMENT
< Back
Next >
Cancel
Intel(R) Installation Frameworks

Figure 7-6: Chipset Driver Readme File Information

Step 14: Read the Readme file information and then click **NEXT** to start the driver installation.

Step 15: After the driver installation process is complete, a confirmation screen appears (**Figure 7-7**).

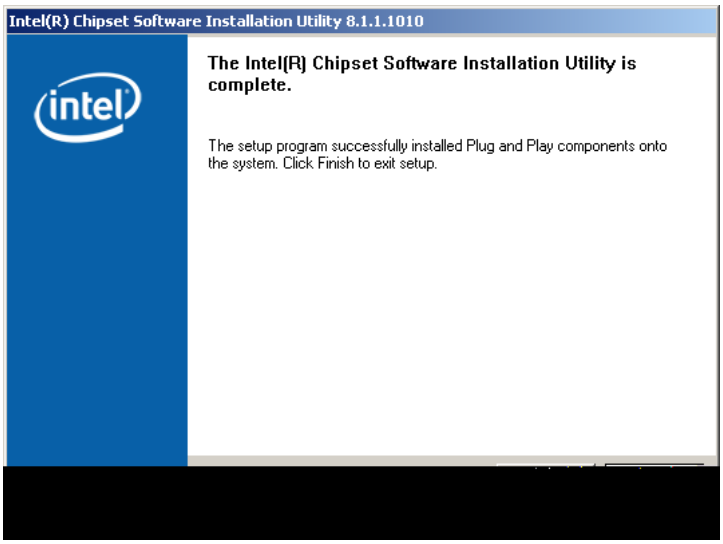

Intel(R) Chipset Software Installation Utility 8.1.1.1010
intel
The Intel(R) Chipset Software Installation Utility is complete.
The setup program successfully installed Plug and Play components onto the system. Click Finish to exit setup.

Figure 7-7: Chipset Driver Installation Complete

Step 16: Click **FINISH** to complete the driver installation.

7.4 Intel® Graphics Media Accelerator Driver Installation

To install the chipset driver, please follow the steps below.

Step 1: Select the VGA driver from the list in **Figure 7-2**.

Step 2: A new window opens (Figure 7-8).

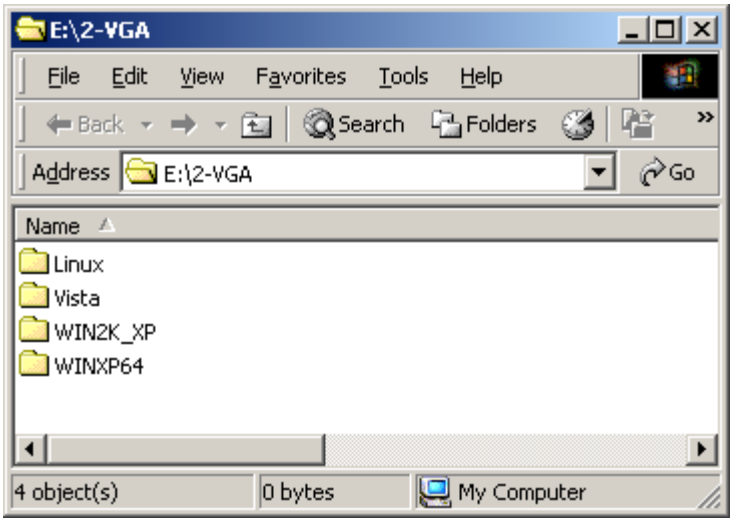


Figure 7-8: Select the Operating System

Step 3: Double-click the appropriate operating system folder.

Step 4: A new window appears (Figure 7-9).

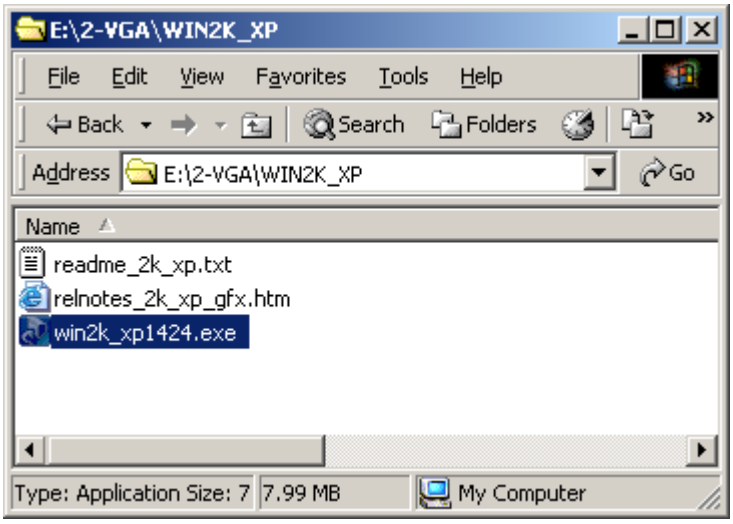


Figure 7-9: VGA Driver

Step 5: Double-click the installation program icon to continue the installation process.

Step 6: The Readme information file shown in Figure 7-10 appears.

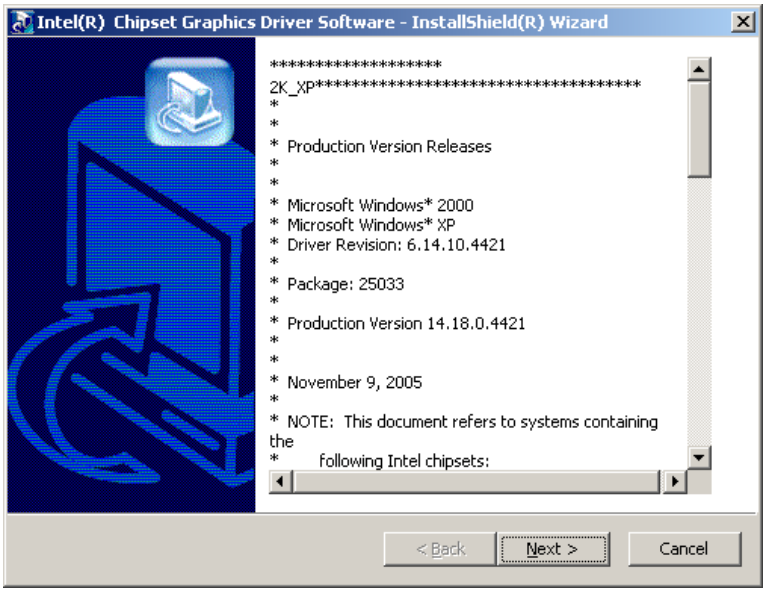


Figure 7-10: Intel® Graphics Media Accelerator InstallShield Wizard

Step 7: Read the Readme file information and click **NEXT** to begin extracting files (Figure 7-11).

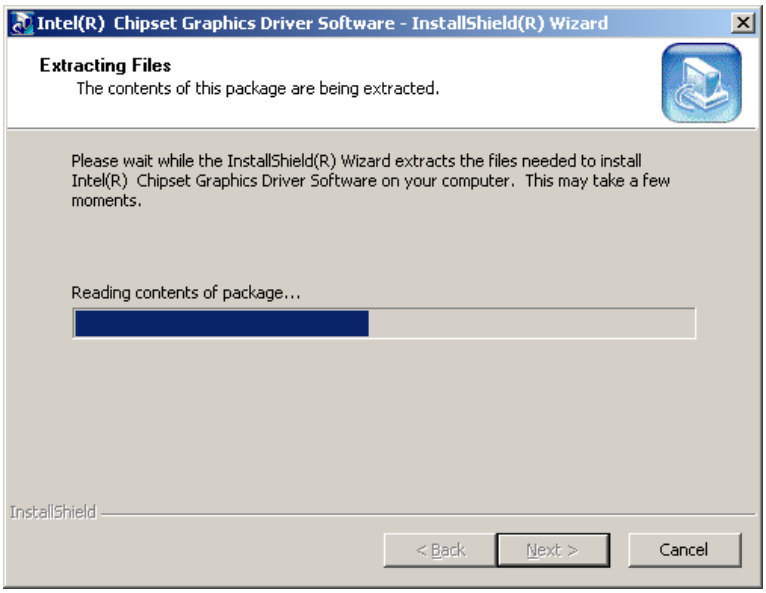

Intel(R) Chipset Graphics Driver Software - InstallShield(R) Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield(R) Wizard extracts the files needed to install Intel(R) Chipset Graphics Driver Software on your computer. This may take a few moments.
Reading contents of package...
InstallShield
< Back
Next >
Cancel

Figure 7-11: InstallShield Wizard Extracting Files

Step 8: The **Graphics Media Accelerator Driver Welcome** screen appears

(Figure 7-12).

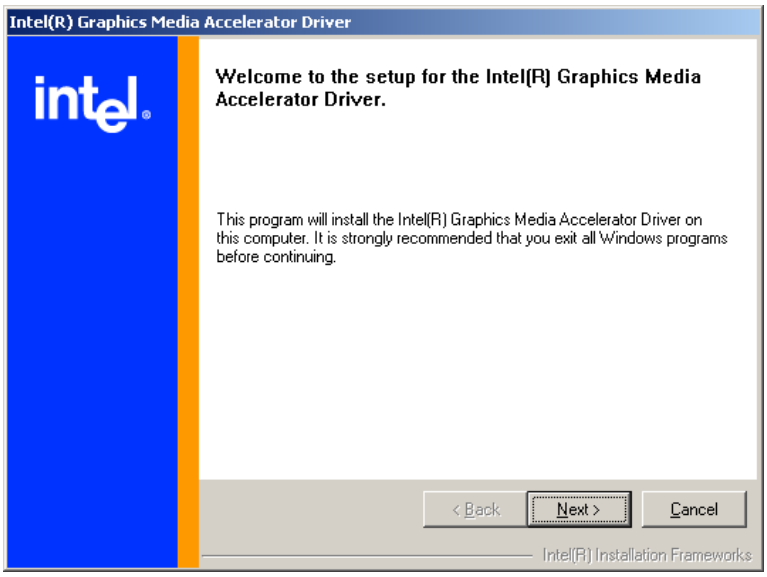

Intel(R) Graphics Media Accelerator Driver
intel
Welcome to the setup for the Intel(R) Graphics Media Accelerator Driver.
This program will install the Intel(R) Graphics Media Accelerator Driver on this computer. It is strongly recommended that you exit all Windows programs before continuing.
< Back
Next >
Cancel
Intel(R) Installation Frameworks

Figure 7-12: Intel® Graphics Media Accelerator Driver Welcome Screen

Step 9: Click **NEXT** and a license agreement appears (Figure 7-13).

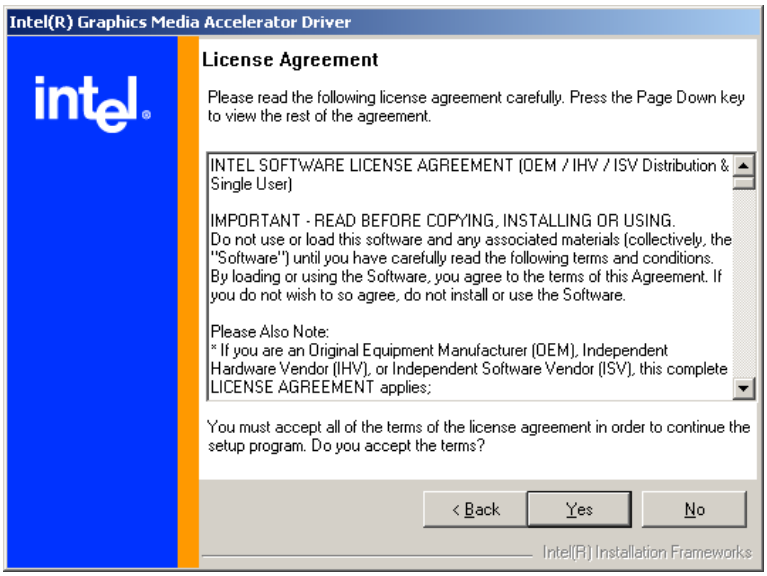

Intel(R) Graphics Media Accelerator Driver
intel
License Agreement
Please read the following license agreement carefully. Press the Page Down key to view the rest of the agreement.
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?
< Back
Yes
No
Intel(R) Installation Frameworks

Figure 7-13: Intel® Graphics Media Accelerator Driver License Agreement

Step 10: Read the license agreement. To accept the terms and conditions stipulated in the license agreement shown, click **YES** and the installation notice appears

(Figure 7-14) as the driver is installed.

Figure 7-14: Intel® Graphics Media Accelerator Driver Installing Notice

Step 11: After the driver installation process is complete, a confirmation screen appears (Figure 7-15).

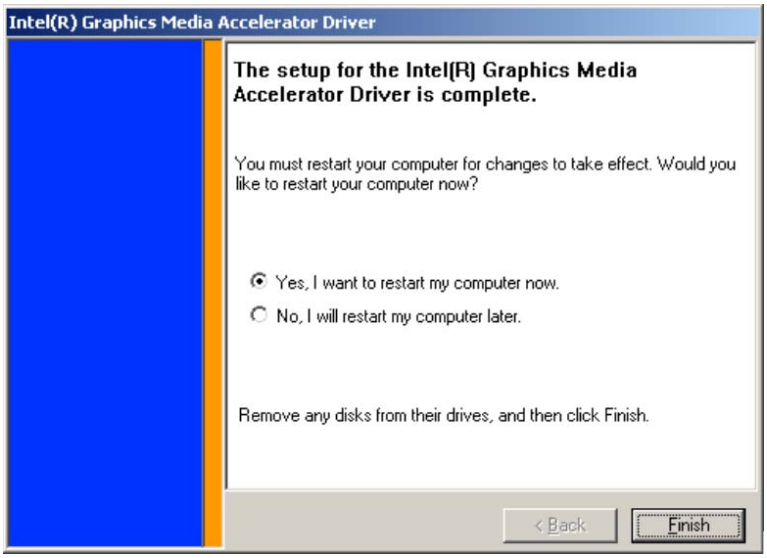

Intel(R) Graphics Media Accelerator Driver
The setup for the Intel(R) Graphics Media Accelerator Driver is complete.
You must restart your computer for changes to take effect. Would you like to restart your computer now?
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish.
< Back
Finish

Figure 7-15: Intel® Graphics Media Accelerator Installation Complete

Step 12: The confirmation screen offers the option of restarting the computer now or later. For the settings to take effect, the computer must be restarted. Click **FINISH** to restart the computer.

7.5 Intel® 82562ET 10/100M LAN Connect Device Driver

To install the Intel® 82562ET 10/100M LAN connect device driver, please follow the steps below.

Step 1: Select **LAN** from the list in **Figure 7-2**.

Step 2: Select **Intel** in the window shown in **Figure 7-16**.

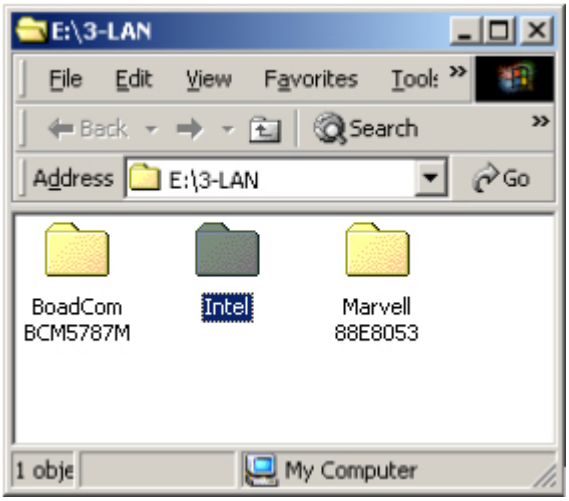


Figure 7-16: Intel® 82562ET Device Driver Startup Icon

Step 3: Click the Intel® 82562ET driver folder in **Figure 7-16**.

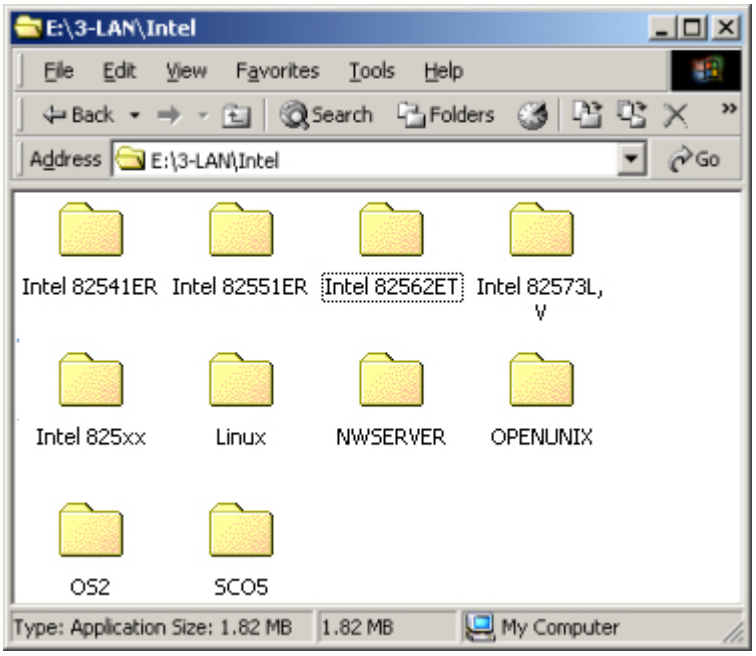


Figure 7-17: Select the Driver

Step 4: Double-click the appropriate operating system folder in **Figure 7-18**

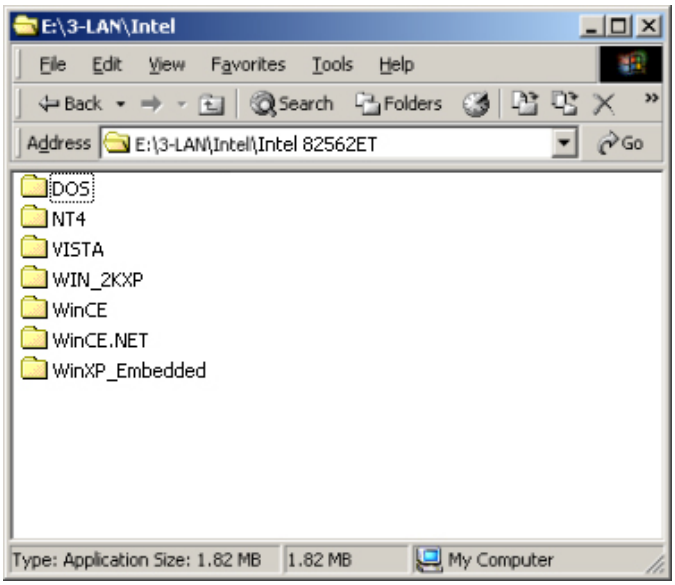


Figure 7-18: Select the Operating System

Step 5: Double-click the installation program icon to continue the installation process.

Step 6: The driver begins to extract the installation files.

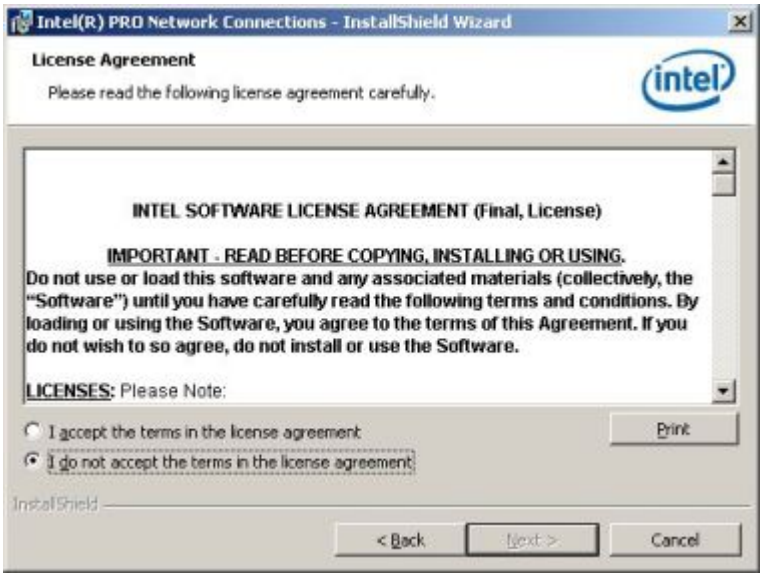
Step 7: The **Welcome** screen in **Figure 7-19** appears next.

Step 8: Click **NEXT** to continue.

Intel(R) PRO Network Connections - InstallShield Wizard
Welcome to the InstallShield Wizard for
Intel(R) PRO Network Connections
intel
Installs drivers, Intel(R) PROSet for Windows* Device Manager, and Advanced Networking Services.
WARNING: This program is protected by copyright law and international treaties.
InstallShield
< Back
Next >
Cancel

Figure 7-19: Intel® 82562ET Welcome Screen

Step 9: The license agreement in **Figure 7-20** appears.


Intel(R) PRO Network Connections - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
INTEL SOFTWARE LICENSE AGREEMENT (Final, License)
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LICENSES: Please Note:
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel

Figure 7-20: Intel® 82562ET Driver License Agreement

Step 10: Accept the conditions of the license agreement and click **NEXT** to continue.

Step 11: The **Setup Options** screen in **Figure 7-21** appears next.

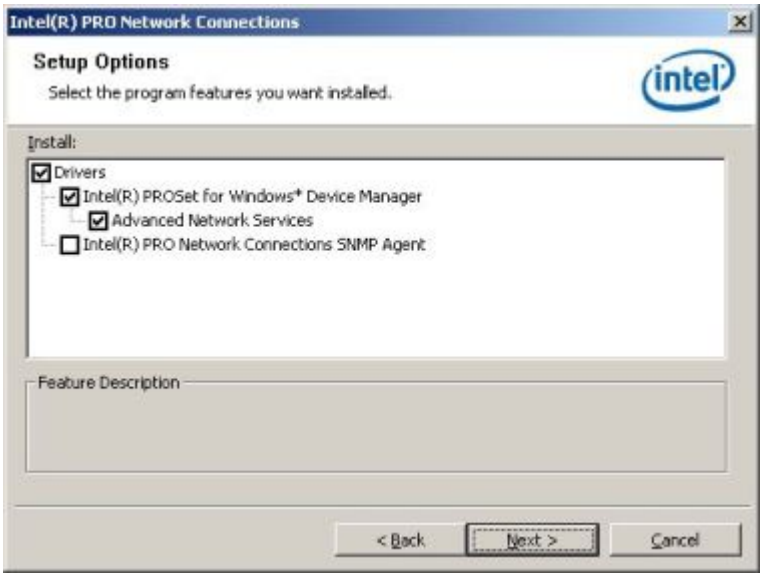

Figure 7-21: Intel® 82562ET Driver Setup Options

Step 12: Select the required installation configuration in **Figure 7-21** and click **NEXT** to continue.

Step 13: The **Ready to Install the Program** window in **Figure 7-22** appears.

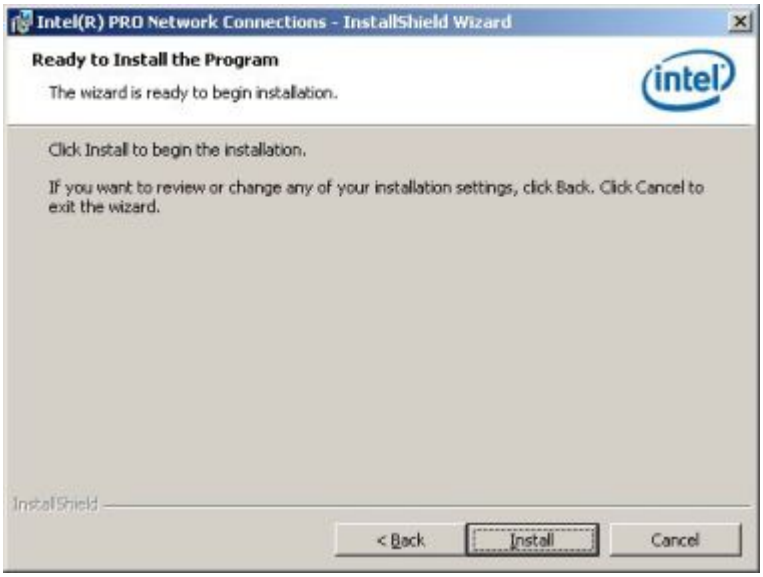
Intel(R) PRO Network Connections - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
intel
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Figure 7-22: Intel® 82562ET Driver Installation Ready Window

Step 14: Click **INSTALL** in **Figure 7-22**.

Step 15: The program starts to install the driver. The window in appears.

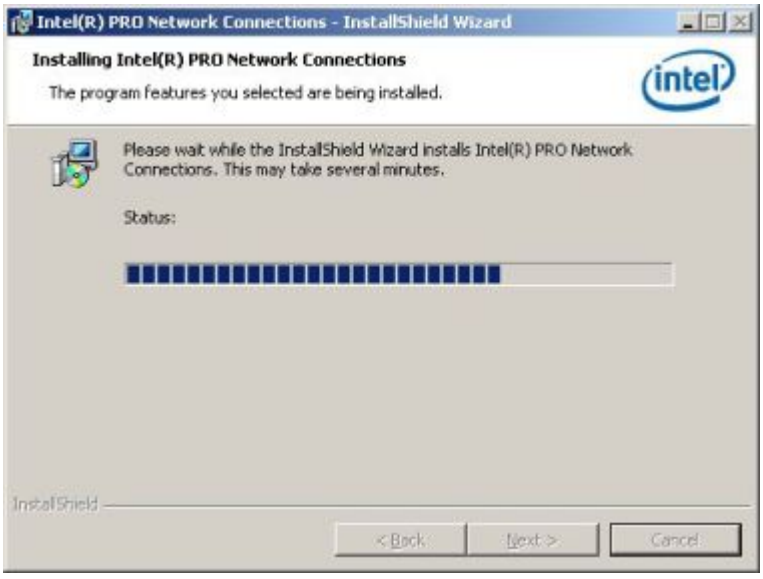
Intel(R) PRO Network Connections - InstallShield Wizard
Installing Intel(R) PRO Network Connections
The program features you selected are being installed.
intel
Please wait while the InstallShield Wizard installs Intel(R) PRO Network Connections. This may take several minutes.
Status:
InstallShield
< Back
Next >
Cancel

Figure 7-23: Intel® 82562ET Driver Installation Progress

Step 16: When the installation is finished. Click **FINISH** in the termination screen.

7.6 Realtek AC`97 Audio Driver (ALC665) Installation

To install the Realtek AC `97 audio driver, please follow the steps below.

7.6.1 BIOS Setup

Step 1: Enter the BIOS setup. To do this, reboot the system and press **DEL** during POST.

Step 2: Go to the Southbridge Configuration menu. Set the **Audio Controller** option to [AC`97].

Step 3: Press **F10** to save the changes and exit the BIOS setup. The system reboots.

7.6.2 Driver Installation

To install the audio driver please follow the steps below.

Step 1: Select **AUDIO** from the list in **Figure 7-2**.

Step 2: A new window opens (**Figure 7-24**).

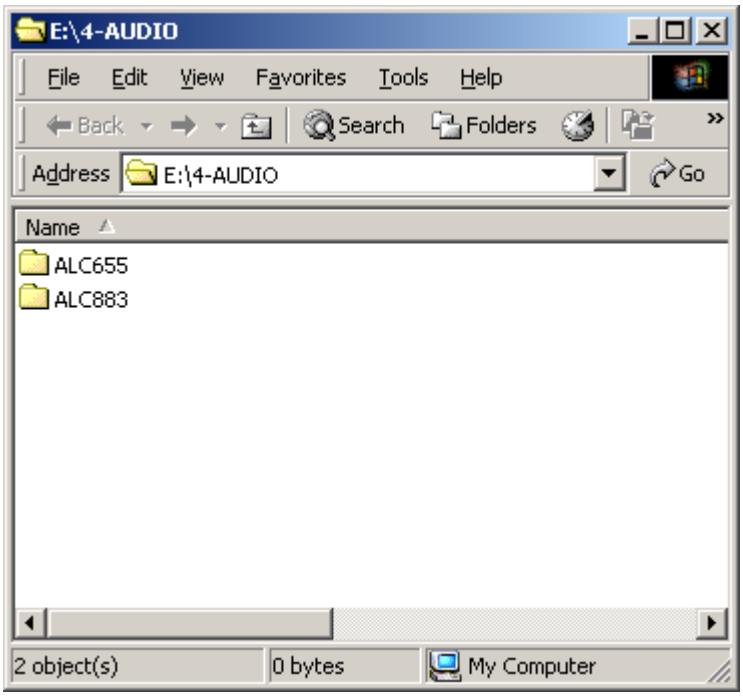

Figure 7-24: Select the Audio CODEC

Step 3: Double-click the **ALC665** folder.

Step 4: Double-click the **WDM_A384.exe** program icon in **Figure 7-25**.

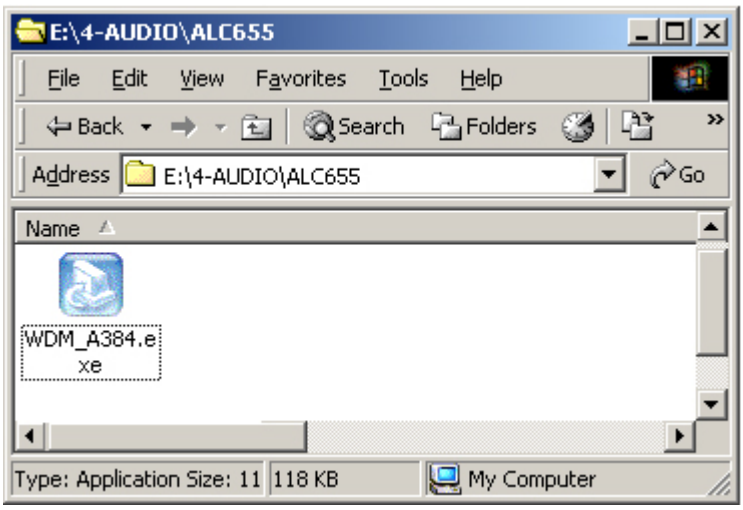

Figure 7-25: Locate the Setup Program Icon

Step 5: The **InstallShield Wizard** is prepared to guide the user through the rest of the process (**Figure 7-26**).

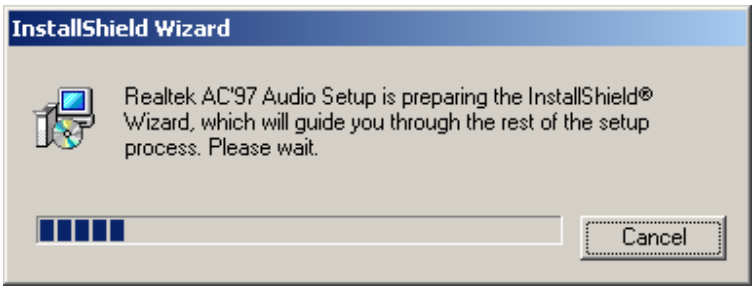
InstallShield Wizard
Realtek AC'97 Audio Setup is preparing the InstallShield® Wizard, which will guide you through the rest of the setup process. Please wait.
Cancel

Figure 7-26: Preparing Setup Screen

Step 6: Once initialized, the **InstallShield Wizard** welcome screen appears (**Figure 7-27**).

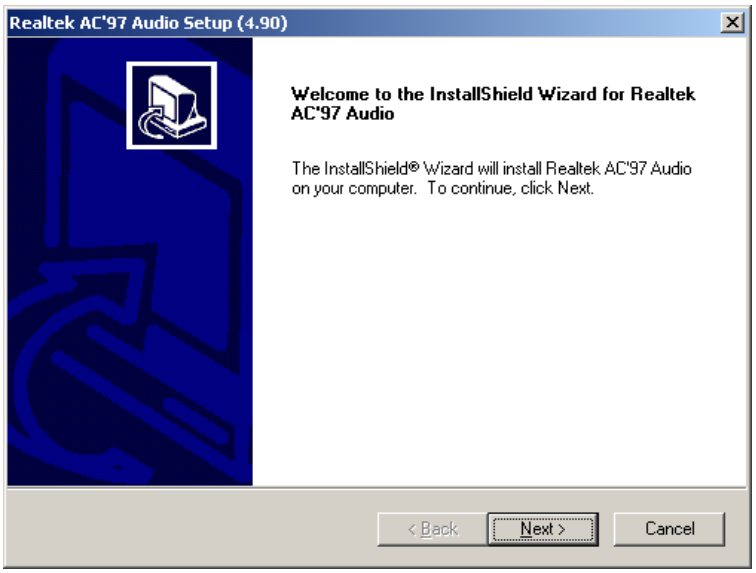
Realtek AC'97 Audio Setup (4.90)
Welcome to the InstallShield Wizard for Realtek AC'97 Audio
The InstallShield® Wizard will install Realtek AC'97 Audio on your computer. To continue, click Next.
< Back
Next >
Cancel

Figure 7-27: InstallShield Wizard Welcome Screen

Step 7: Click **NEXT** to continue the installation.

Step 8: InstallShield starts to install the new software as shown in **Figure 7-28**.

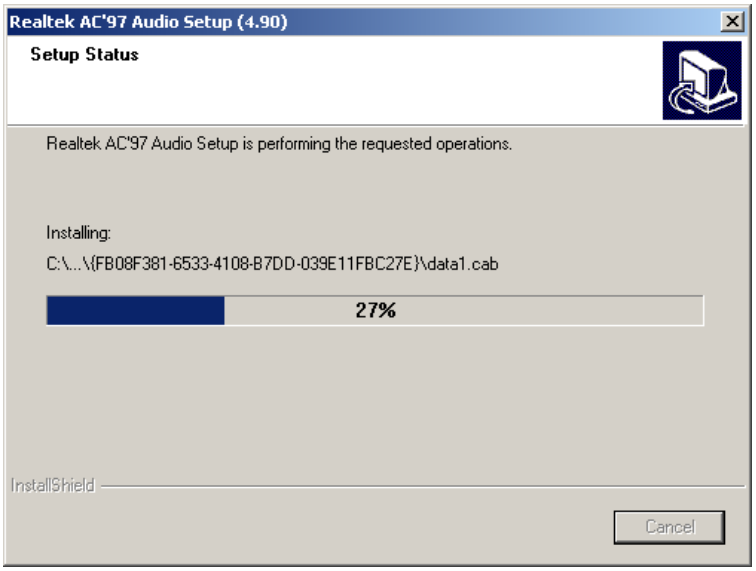

Figure 7-28: Audio Driver Software Configuration

Step 9: At this stage the **Digital Signal Not Found** screen shown in **Figure 7-29** appears.

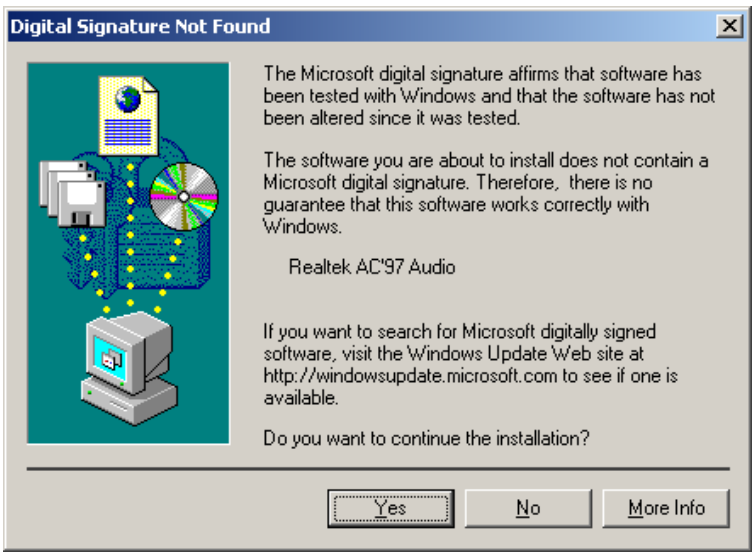
Digital Signature Not Found
The Microsoft digital signature affirms that software has been tested with Windows and that the software has not been altered since it was tested.
The software you are about to install does not contain a Microsoft digital signature. Therefore, there is no guarantee that this software works correctly with Windows.
Realtek AC'97 Audio
If you want to search for Microsoft digitally signed software, visit the Windows Update Web site at http://windowsupdate.microsoft.com to see if one is available.
Do you want to continue the installation?
Yes
No
More Info

Figure 7-29: Audio Driver Digital Signal

Step 10: Click **YES** and the driver installation begins (**Figure 7-30)**.

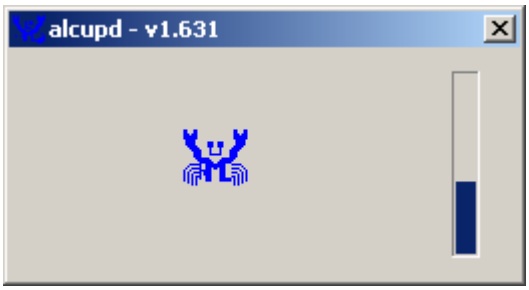

Figure 7-30: Audio Driver Installation

Step 11: After the driver installation process is complete, a confirmation screen appears (**Figure 7-31**).

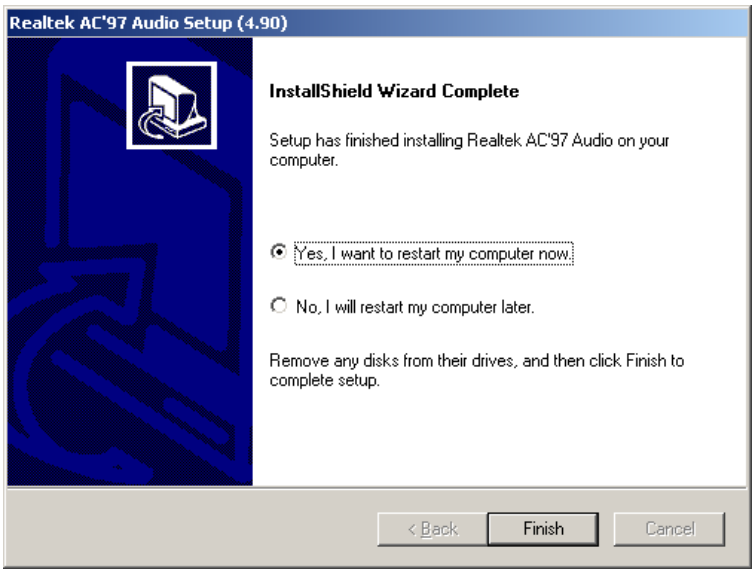
Realtek AC'97 Audio Setup (4.90)
InstallShield Wizard Complete
Setup has finished installing Realtek AC'97 Audio on your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
< Back
Finish
Cancel

Figure 7-31: Restart the Computer

Step 12: The confirmation screen offers the option of restarting the computer now or later. For the settings to take effect, the computer must be restarted. Click **FINISH** to restart the computer.

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Appendix

A

BIOS Options

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Appendix

B

Terminology

AC ’97	Audio Codec 97 (AC’97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
APM	The Advanced Power Management (APM) application program interface (API) enables the inclusion of power management in the BIOS.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude (“volume”) of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CompactFlash®	CompactFlash® is a solid-state storage device. CompactFlash® devices use flash memory in a standard size enclosure. Type II is thicker than Type I, but a Type II slot can support both types.
CMOS	Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.
COM	COM refers to serial ports. Serial ports offer serial communication to

	expansion devices. The serial port on a personal computer is usually a male DB-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MBps and 16.6 MBps.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GPIO	General purpose input
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
ICH	The Input/Ouput Controll Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate

	with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
QVGA	Quarter Video Graphics Array (QVGA) refers to a display with a resolution of 320 x 240 pixels.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.

USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates, while USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

Watchdog Timer

NOTE:

The following discussion applies to DOS environment. IEI support is contacted or the IEI website visited for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table C-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. While the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the Watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

Example program:

```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT      15H
 ;
; ADD THE APPLICATION PROGRAM HERE
;
        CMP      EXIT_AP, 1     ;is the application over?
        JNE      W_LOOP         ;No, restart the application

        MOV     AX, 6F02H       ;disable Watchdog Timer
        MOV     BL, 0           ;
        INT      15H
;
; EXIT ;
```

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Appendix

D

Address Mapping

D.1 Address Map

I/O address Range	Description
000-01F	DMA Controller
020-021	Interrupt Controller
040-043	System time
060-06F	Keyboard Controller
070-07F	System CMOS/Real time Clock
080-09F	DMA Controller
0A0-0A1	Interrupt Controller
0C0-0DF	DMA Controller
0F0-0FF	Numeric data processor
1F0-1F7	Primary IDE Channel
2F8-2FF	Serial Port 2 (COM2)
378-37F	Parallel Printer Port 1 (LPT1)
3B0-3BB	Graphics Controller
3C0-3DF	Graphics Controller
3F6-3F6	Primary IDE Channel
3F7-3F7	Standard floppy disk controller
3F8-3FF	Serial Port 1 (COM1)

Table D-1: IO Address Map

D.2 1st MB Memory Address Map

Memory address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
F0000-FFFFF	System BIOS
1000000-	Extend BIOS

Table D-2: 1st MB Memory Address Map

D.3 IRQ Mapping Table

IRQ0	System Timer	IRQ8	RTC clock
IRQ1	Keyboard	IRQ9	ACPI
IRQ2	Available	IRQ10	LAN
IRQ3	COM2	IRQ11	LAN/USB2.0/SATA
IRQ4	COM1	IRQ12	PS/2 mouse
IRQ5	SMBus Controller	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Available	IRQ15	Secondary IDE

Table D-3: IRQ Mapping Table

D.4 DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Floppy disk (8-bit transfer)
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

Table D-4: IRQ Mapping Table

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Appendix

E

Compatibility

NOTE:

The compatible items described here have been tested by the IEI R&D team and found to be compatible with the IEM-9452.

E.1 Compatible Operating Systems

The following operating systems have been successfully run on the IEM-9452.

- Microsoft Windows Vista (32-bit)
- Microsoft Windows Vista (64-bit)
- Microsoft Windows XP with SP2
- Microsoft Windows 2000 with SP4
- Fedora Core 7

E.2 Compatible Memory Modules

NOTE:

The memory modules listed below have been tested on the IEM-9452 other memory modules that comply with the specifications may also work on the IEM-9452 but have not been tested.

The following memory modules have been successfully tested on the IEM-9452.

Manufacturer	Chip Model No.	Capacity	Speed
A-DATA	AD29608A8A-3EG	512 MB	667 MHz
Apacer	AM485708H0JS5D	512 MB	533 MHz
Kingston	HY5PS12821C FP-Y5	512 MB	533 MHz
Kingston	D6408TEBGGL3U	512 MB	667 MHz

Kingston	HY5PS12821B FP-Y5	1 GB	667 MHz
Kingston	D9HNL	2 GB	667MHz
Transcend	E5108AG-5C-E	512 MB	533 MHz
Transcend	A3R12E3GEF652BLC14	512 MB	667 MHz
Transcend	D9HNP	2 GB	800 MHz

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Appendix

F

Hazardous Materials Disclosure

F.1 Hazardous Material Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	x	O	O	O	O	x
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

Appendix

G

External AC'97 Audio CODEC

G.1 Introduction

The motherboard comes with an onboard Realtek ALC655 CODEC. The ALC655 is a 16-bit, full-duplex AC'97 Rev. 2.3 compatible six-channel audio CODEC that provides three pairs of stereo outputs with 5-bit volume control, a mono output, and multiple stereo and mono inputs, along with flexible mixing, gain, and mute functions.

G.1.1 Accessing the AC'97 CODEC

The CODEC is accessed through the phone jacks on the baseboard. The phone jacks include:

- LINE IN
- LINE OUT
- MIC IN

G.1.2 Driver Installation

The driver installation has been described in **Section 7.6**.

After rebooting, the sound effect configuration utility appears in the **Windows Control Panel** (**Figure G-1**). If the peripheral speakers are properly connected, sound effects should be heard.

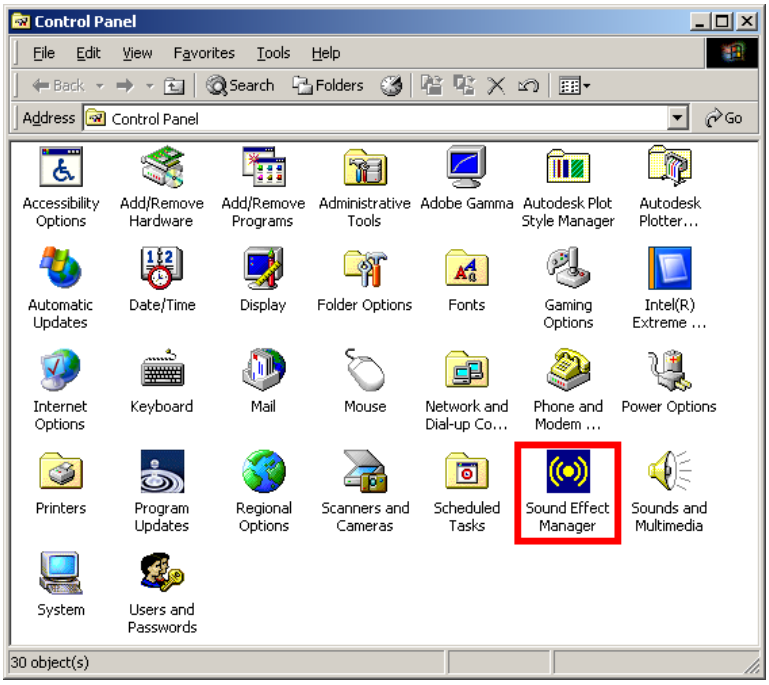

Figure G-1: Control Panel Sound Effect Manager

G.2 Sound Effect Configuration

G.2.1 Accessing the Sound Effects Manager

Follow the steps below to access the **Sound Effect Manager**.

Step 1: Install the ALC655 audio codec driver (see **Section 7.6**).

Step 2: Click the **Sound Effect Manager** icon in the system task bar (**Figure G-2**).

Figure G-2: Sound Effect Manager Icon [Task Bar]

Step 3: The sound effect manager appears (**Figure G-3**).

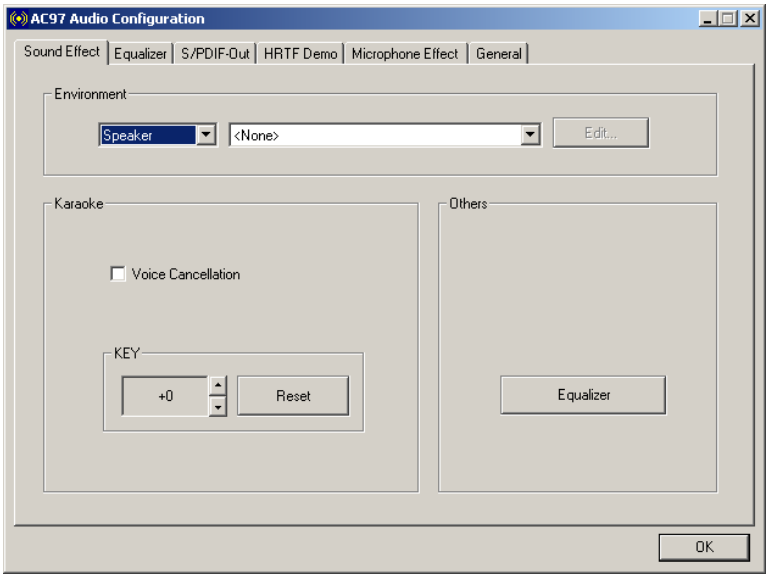

Figure G-3: Sound Effects Manager (ALC655)

NOTE:

The Sound Effect Manager shown in Figure G-3 is for the RealTek ALC655 audio CODEC. Different CODECs may have different sound manager appearances.

The following section describes the different configuration options in the Sound Effect Manager.

G.2.2 Sound Effect Manager Configuration Options

The **Sound Effects Manager** enables configuration of the items listed below. To configure these items click the corresponding menu tab in the **Sound Effects Manager** (**Figure G-3)**.

NOTE:

The Karaoke Mode is configured in the Sound Effect menu. To access Karaoke configuration settings, click on the Sound Effect menu tab.

- Sound Effect
- Karaoke Mode
- Equalizer
- Speaker Configuration
- Speaker Test
- S/PDIF-In
- S/PDIF-Out
- Connector Sensing
- HRTF Demo
- Microphone Effect
- General

NOTE:

Not all RealTek Sound Effect Managers have all the above listed options. The Sound Effect Manager loaded onto the system may only have some of the options listed above.

Below is a brief description of the available configuration options in the **Sound Effects Manager**.

- ***Sound Effect*** - Select a sound effect from the 23 listed options in the drop down menu. Selected sound effect properties can be edited. Click **EDIT** to edit the sound effect.
- ***Karaoke Mode*** - **Karaoke Mode** is accessed in the Sound Effect tab. The **Voice Cancellation** disables the vocal part of the music being played. The

Key adjustment up or down arrow icons enable users to define a key that fits a certain vocal range.

- ***Equalizer Selection*** - Preset equalizer settings enable easy audio range settings. Ten frequency bands can be configured.
- ***Speaker Configuration*** - Multi-channel speaker settings are configured in this menu. Configurable options include:
  - Headphone
  - Channel mode for stereo speaker output
  - Channel mode for 4 speaker output
  - Channel mode for 5.1 speaker output
  - Synchronize the phonejack switch with speakers settings
- ***Speaker Test*** - Each speaker connected to the system is tested individually to see if the 4-channel or 6-channel audio operates properly.
- ***S/PDIF-In & S/PDIF-Out*** - S/PDIF is used to transmit digital and analog audio signals with either a 48 or 44.1kHz sample rate.
- ***HRTF Demo*** - Adjust HRTF (Head Related Transfer Functions) 3D positional audio before running 3D applications.
- ***Microphone Effect*** - Microphone noise suppression is enabled in this menu.
- ***General*** - General information about the installed AC'97 audio configuration utility is listed here.

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